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ABSTRACT

This document, the last volume of a four-part publication, describes the programs in basic skills in mathematics at the nine senior colleges and eight community colleges of the City University of New York (CUNY), updating surveys made in 1976. These programs are for students who do not meet CUNY's standard for minimum competency in mathematics, or higher standards set by the colleges in which they are enrolled. For each college, course structure and content, placement and population, teaching methods, support services, exit criteria and retesting provisions, faculty, and response to the CUNY Mathematics Assessment Test (CMAT) are described. Two tables summarize the information, and appendices present the CMAT and additional items for students intending to major in mathematics-related fields, an interview questionnaire, and the basic mathematics resource persons at each college. (MNS)

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BASIC SKILLS PROGRAMS AT THE CITY UNIVERSITY OF NEW YORK: MATHEMATICS

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FOREWORD

With great pleasure I introduce the fourth and last volume of a four-part publication describing the programs in basic skills in writing, reading, English as a second language, and mathematics at the seventeen undergraduate colleges of the City University of New York (CUNY). Each volume describes course sequences and content, curricula, support services, teaching methods and materials, and the impact of the Freshman Skills Assessment Program (FSAP)* on basic skills programs. The present publication updates surveys conducted through CUNY's Instructional Resource Center in 1976, just two years after its founding. The original surveys formed the basis for the book, Teaching Basic Skills in College, published by Jossey-Bass and now in its second printing. Because of program changes since 1976, because of increasing national interest in remediation at the college level, and because of the impact of the Freshman Skills Assessment Program, updating the surveys has been a high priority of the Instructional Resource Center.

This volume describes the mathematics programs for students who do not meet CUNY's standard for minimum competency in mathematics or higher standards set by the colleges in which they are enrolled. The CUNY Mathematics Assessment Test (CMAT), the means by which the University measures competence in mathematics, is

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*FSAP, mandated by the Board of Higher Education in April 1976 and implemented in Fall 1978, requires that all matriculated students entering CUNY be tested in reading, writing, and mathematics. If students do not meet CUNY standards, they are assigned to appropriate remediation at their colleges; all students must meet CUNY standards prior to entering their junior year.

described in Appendix A.

Work on the present volume began in January 1980 with a letter from Vice Chancellor for Academic Affairs Leonard O. Rosing to the Chief Academic Officers of the seventeen undergraduate colleges asking them to identify those in charge of each of the basic skills programs in mathematics at their colleges. I asked Dr. Miriam Hecht--who had surveyed the basic skills mathematics programs in CUNY in 1976, and again in 1978, and who later co-authored two chapters of Teaching Basic Skills in College--to conduct the surveys. Dr. Hecht decided on the general categories of information to be gathered and developed a questionnaire (Appendix B), which she sent to each college. Then, during the academic year 1980-81, Dr. Hecht interviewed the designated individuals at the seventeen colleges. After her reports were written, I reviewed them and returned them to the persons interviewed for verification. The revised reports were then sent to the Chief Academic Officers for their review.

From the beginning, I have been concerned that the reports should be descriptive rather than evaluative. The process by which we gathered the information is important because of the general concern that these reports reflect reality, although we at the Resource Center have been engaged in numerous philosophical debates about the multiplicity of realities which exist. Data on the programs were self-reported by each college. Readers who want additional information on a given program may wish to contact the resource persons listed in Appendix C.

Too often teachers labor in their classrooms and departments without information about what colleagues within CUNY are doing to teach students similar to their own. Too often administrators make decisions about programs at their campuses without full information about current practices at other campuses. For these reasons, the Instructional Resource Center has disseminated these surveys widely throughout CUNY with the expectation that they will by useful to all concerned with the improvement of instruction in the basic skills.

I am grateful for the time so generously contributed by those interviewed, as well as to all those who reviewed the drafts at the campuses. Barry Kwalick, a coordinator of the Instructional Resource Center, edited the manuscript and saw it through the publication process. For the inevitable omissions or inaccuracies the responsibility is mine.

Marie Jean Lederman
University Asssociate Dean
Academic Affairs;
Director, Instructional
Resource Center

INTRODUCTION

In higher education, it is generally assumed that skill in reading and writing is essential for college-level work and that the higher the level of skill, the better the student's prospects for academic success. In the field of mathematics, however, there is considerable diversity of program objectives, and this is reflected at CUNY. On some campuses, the primary purpose of the basic mathematics program is to instill mathematical competencies needed by adults and consumers. On others, the programs are designed to prepare students for subsequent course work--which will itself differ from student to student. Basic mathematics is variously considered a vehicle for improving study habits and reasoning, an essential component of humanistic culture, and a key subject providing access to a growing number of careers.

This diversity applies less to students in mathematics-related curricula (such as science, business, economics, and the technologies) than to those students in the liberal arts. For the former group, the requisite mathematical preparation is unequivocal. Most technology students require a foundation in algebra, coordinate geometry, trigonometry, and possibly logarithms. Those preparing for calculus need additional work in these areas, as well as an introduction to function theory. All CUNY colleges--like most colleges throughout the country--offer this content, although topics considered college-level on some campuses may be perceived as part of basic skills on others.

However, for CUNY students in the liberal arts--and we will use this catch-all term to designate those fields in which no specific mathematical content is required--diverse program goals have led to a variety of placement procedures, methodologies, and curricula. When cultural goals predominate, content is likely to include some axiomatic geometry, and students who have encountered the material in high school are usually exempted. When the goal is development of consumer skills, the content emphasizes practical applications; placement is usually governed by score on a standardized test. When the goal is preparation for subsequent coursework, the student's test score and field of study, as well as the college's own required course structure, become decisive factors. The goal of improving logical thinking affects the tone and emphasis of the basic skills course, whatever the content. It is noteworthy that prior to the adoption of the CUNY Mathematics Assessment Test (CMAT) in Fall 1978, at least one senior college had no mathematics requirement at all, remedial or college-level, except where the student's course of study specified it.

One consequence of the CMAT, which covers arithmetic and introductory algebra (see Appendix A), is that university-wide the basic mathematics programs have become more similar. However, there is still considerable variation. On the one hand, most senior colleges mandate more material than is covered on the test; on the other, several of the community colleges require less, except for students in transfer or mathematics-related curricula. Hence the CUNY basic skills programs in mathematics continue to be characterized by a

broad spectrum of placement procedures, topics, and instructional techniques.

As already noted, all colleges offer the standard sequence of courses leading to calculus: arithmetic, elementary algebra, intermediate algebra, and precalculus. In the main, the content of the CUNY basic mathematics programs is taken from this sequence. However, various additional topics may be included. One senior college with a substantial science requirement mandates a course preparing students for work in this area. Another introduces topics from statistics and computer programming, two fields generally considered "college level." Measurement (possibly including the metric system) appears in some curricula; additional topics from Euclidean geometry appear in several others. On some campuses, nurses take a special course in medical measurements instead of the regular arithmetic course.

The colleges also differ in two other respects: which topics are considered part of the basic skills program and which, college-level; and how much of the material is mandated for all students, regardless of their fields of study.

Among the eight community colleges,* all require that students weak in arithmetic take a basic skills course in this area, and all

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*For descriptive purposes we are classifying New York City Technical College as a community college; however, the College has been reclassifed for funding purposes as CUNY's first counterpart of the six State University agricultural and technical colleges.

use the CMAT as an aid in placement. On all these campuses, elementary algebra is also part of the basic skills program; however, only three of them require it of all students regardless of major. More advanced topics are considered remedial at four colleges, and only two of these have a college-wide requirement at this level.

The senior colleges present a different picture. Clearly, all candidates for a bachelor's degree must be offered both arithmetic and elementary algebra, since these students must meet CUNY proficiency requirements in mathematics before moving to the upper division. Most senior colleges also include intermediate algebra (but not precalculus) in the basic skills program; however, only two mandate it as a condition for graduation. On the remaining campuses, placement into intermediate algebra depends not only on test score, but also on field of study and high school preparation.

On the basis of these placement procedures, about 70 percent of CUNY students are required to take basic skills courses in mathematics. To compare individual colleges is misleading, since the content considered college-level on some campuses is included in the basic skills programs on others.

Basic skills classes are usually scheduled to meet for one to six hours a week. Often the same content is offered in an accelerated version for stronger students and an extended form for the others. Additional hours in a math lab are available at sixteen of the colleges and are mandated in some cases.

As a rule, arithmetic carries no credit regardless of the number of hours, and elementary algebra carries little or none. In more advanced courses, credit may reflect the inclusion of relatively demanding topics. In no case does the credit match the number of contact hours, as it normally would in college-level work. Seven colleges--five community colleges and two senior colleges--grant no credit at all for any basic skills mathematics course. The community colleges are reluctant to grant credit for two reasons. First, their basic skills courses often include only arithmetic and elementary algebra; and second, their degrees require only sixty credits altogether, so even a few basic skills credits would loom disproportionally large.

With only a few exceptions, administration of the basic mathematics programs is in the hands of the mathematics departments. One college offers the program in a separate department of developmental skills. At another, the SEEK department, serving a special population of disadvantaged students, offers its own versions of the college's basic skills courses. On several campuses SEEK works jointly with the mathematics department.

Among the community colleges, all mathematics faculty teach basic skills. Adjuncts are used on all but one campus, with the proportion varying from 15 to 65 percent. Two colleges are in the process of retraining out-of-department faculty to teach basic skills mathematics. At the senior colleges, the situation is somewhat different. Five of them report that all faculty teach basic

mathematics; at the remainder, the individual professor's preferences and expertise are taken into account. Again, adjuncts are used as needed. One college staffs its entire program with adjuncts, except for two full-time staff members who serve as coordinators.

Most colleges describe their pedagogy as "traditional," consisting of informal lectures and discussions, along with problem solving and homework review. However, one campus has used federal funds to computerize its program, and others are moving toward increased use of videotapes or microcomputers. Four colleges have modularized some or all of their basic mathematics courses, with the number of modules per semester ranging from two to four. One campus offers its first course in a modified self-paced mode, in which individual study and tutoring have replaced the conventional classroom.

As of Spring 1981, sixteen of the CUNY colleges had math labs. (Since then, the remaining campus has also opened a lab.) Staff includes technicians, faculty, and/or tutors; the latter are often qualified undergraduates. The labs are open from 35 to 60 hours a week, including evenings and weekends. Apart from tutoring, resources may include videotapes, calculators, microcomputers (usually for practice and drill), and a host of supplementary texts, worksheets, sample tests, and other printed materials. While math labs are usually considered a supplementary resource, some colleges actually schedule classes to meet there one or more hours per week;

the self-paced program mentioned earlier conducts all its classes in the lab. Several labs have also assumed responsibility for administering tests, particularly in programs where students are required to repeat each test until mastery has been demonstrated.

There is considerable variation in the use of the CMAT as an exit criterion for basic skills courses. At nine of the seventeen colleges, it plays little part; faculty judgment and locally prepared tests are virtually the sole exit criteria. (In one course at one of these colleges, meeting the CUNY proficiency criterion is an alternate exit channel.) Of the remaining eight colleges, five augment the CMAT with faculty evaluations and local tests; three accept the CMAT as the sole exit criterion, and then in only certain of their basic courses.

Faculty reaction to the CMAT has been mixed. Four colleges expressed the view that while the test might be satisfactory "for its purpose," it was too elementary for their particular institutions. An additional four colleges were concerned because it did not address the needs of any single, identifiable group; two schools claimed that the level was too low for science students and too high for those in the liberal arts. On the other hand, test content was considered appropriate at nine colleges--six community colleges and three senior colleges. Several of the community colleges were gratified that the basic skills program, which had formerly offered either arithmetic or algebra, was now called upon to provide both. By the same token, one senior college

expressed the view that students in upper-division courses would now be better prepared. Earlier fears that the CUNY "minimum" might become a maximum have abated, as has concern about the reliability and validity of the CMAT.

Perhaps the one theme underlying the CUNY basic mathematics programs is the creativity and responsiveness of the faculty. They have been pioneers in the organization and pedagogy of such programs: the first description of a modular program was contributed by a CUNY professor, and an arithmetic videotape series directed by another is in use throughout the country. The CUNY Bibliography of Basic Skills lists 32 commercially published texts authored by mathematics faculty, along with dozens of locally-prepared studies, modules, and teaching aids. Even as the material was being gathered for these reports, a common observation was, "You ought to come back next semester. We'll be trying something new." But this has been the case for the last ten years and will undoubtedly continue as long as basic skills in mathematics are part of the curriculum.

Miriam Hecht

THE REMEDIAL MATHEMATICS PROGRAM AT BARUCH COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at Baruch College consists of five components: four half-semester modules designed to prepare students for college-level work in mathematics, supplemented by one full-semester course for students who need help in arithmetic. The five components are described below.

MATH 0100: Basic Preparatory Mathematics. This course covers arithmetic and elementary algebra. Arithmetic topics include operations with whole numbers, fractions, and decimals; ratio and proportion, and percentage. Topics from algebra include operations with signed numbers and algebraic expressions; the distributive law; first-degree equations, including literal equations, and word problems.

MATH 01: Preparatory Mathematics I covers all of the algebra topics from MATH 0100.

MATH 02: Preparatory Mathematics II is a continuation of elementary algebra, including factoring, use of the number line, operations with rational expressions, fractional equations, ratio and proportion, and word problems.

MATH 03: Preparatory Mathematics 3. Topics include rectangular coordinates; graphing straight lines; systems of linear equations, including graphing, and their simultaneous solution; the equation of a line, including slope; graphs of linear inequalities; word problems incorporating these topics, and radicals and roots.

MATH 04: Preparatory Mathematics 4 combines further material in algebra with essential precalculus topics. These include integral and fractional exponents; scientific notation; complex numbers, quadratic equations, parabolas, functions and functional notation, cubic equations; and word problems incorporating these topics.

Additional information appears in the table below.

Course	Credits	Hours	Duration
MATH 0100	0	3	1 semester
MATH 01	0	4	½ semester
MATH 02	0	4	½ semester
MATH 03	0	4	½ semester
MATH 04	0	4	½ semester

Placement and Population

Baruch uses the CUNY Mathematics Assessment Test (CMAT) only for placement into the first course, MATH 0100. Students who score 10 or less in the arithmetic portion of the test are assigned to this course.

Otherwise, the chief placement instrument is a 70-question test prepared, scheduled, and administered by the Mathematics Department. This test is divided into four parts, covering elementary and intermediate algebra and topics from precalculus; it determines placement in MATH 01, MATH 02, MATH 03, and MATH 04. Nominally, students scoring below 60 percent on any part enroll in the corresponding course. However, placements are individually reviewed prior to the start of the semester, and students' goals and high school records are taken into account along with test scores. Students may voluntarily register for MATH 01, in which case they need not take the test at all. At the other extreme, students who have passed the Regents examination in 11th-year mathematics are exempt from all four courses. Incoming freshmen are not normally placed in MATH 04; if they are exempted from all of the previous remedial courses, they are permitted to enroll for college-level work in mathematics.

By these criteria, about 70 percent of incoming Baruch students place into the remedial sequence.

Methods

All classes in the Baruch remedial mathematics program are taught by conventional lecture-discussion methods. Classes always meet for a double period twice a week; it is felt that this substantial, uninterrupted time block permits a more intensive treatment of each topic than could be provided in a conventional 50-minute period.

Support Services

The Mathematics Department maintains its own tutoring facility, staffed by full-time faculty (for a total of about 15 hours a week). Assistance is provided in both remedial and college-level courses.

However, remedial students can also avail themselves of the Compensatory Skills Department laboratory. This lab is open about 40 hours a week and can accommodate up to 150 students. It offers small-group and (more rarely) individual tutoring, both by appointment and on a walk-in basis. Tutors are upper-division Baruch students and graduate students at Baruch and elsewhere. Resources include supplementary texts and work-sheets; it is hoped that audio-visual and computer support will ultimately become available.

Exit Criteria; Retesting

In all cases, the exit criteria from a remedial course are faculty judgment and performance on a final examination, prepared either by the individual instructor (for courses ending in mid-semester) or the department. Students in MATH 0100 take the same exit examination as those in MATH 01. However, their names are forwarded to Baruch's Skills Assessment Testing Office with the recommendation that they repeat the CMAT as soon as possible after completing MATH 0100.

Faculty

About one-third to one-half of all remedial mathematics sections are staffed by full-time mathematics faculty, the remain-

der are staffed by adjuncts. It has not been necessary to utilize out-of-department faculty for this purpose.

At present, a member of the Department of Education is doing federally-funded research on teaching methods in remedial courses. He has presented lectures and demonstrations for other remediation faculty; the consensus is that remedial teaching has improved markedly as a result of this effort.

Response to the CMAT

Because Baruch's own standards are so much higher than those of the CMAT, there has in the past been little faculty reaction to the test. Now that the CMAT is in its third year and is being used as the entrance criterion for one of the departmental remediation courses, awareness of the test is increasing. In general, it is felt that while the CMAT is appropriate to its purpose, this purpose is not central to the population or goals of Baruch College.

THE REMEDIAL MATHEMATICS PROGRAM AT BROOKLYN COLLEGE

Course Structure and Content; Administration

The Brooklyn College remedial mathematics program consists of five half-semester courses, organized into two sequences. The first sequence, MATH 0.01 and MATH 0.02, is designed to prepare students for the CUNY Mathematics Assessment Test (CMAT). The second, MATH 0.03, MATH 0.04, and MATH 0.05, provides the mathematical foundation required of students in education, technology, or science. All five courses are administered by the Mathematics Department of the College.

MATH 0.01: Remedial Mathematics I is an intensive study of the arithmetic required for Part I of the CMAT; that is, operations with whole numbers, fractions, ratios and proportions, decimals, and percents.

MATH 0.02: Remedial Mathematics II is an intensive study of the material required for Part II of the CMAT; that is, selected topics from elementary algebra and measurement of geometric figures.

MATH 0.03: Remedial Mathematics III completes the content of elementary algebra and continues with an intensive study of topics from geometry.

MATH 0.04: Remedial Mathematics IV presents topics from intermediate algebra, including manipulation of rational expressions, laws of exponents, radicals and roots, etc.; it also provides an introduction to trigonometry.

MATH 0.05: Remedial Mathematics V is an intensive study of logarithms and trigonometry, designed to prepare students for the College's non-remedial precalculus course.

Additional information on these five courses is provided below.

Course	Credits	Hours	Duration
MATH 0.01	0	6	½ semester
MATH 0.02	0	6	½ semester
MATH 0.03	0	6	½ semester
MATH 0.04	0	4	½ semester
MATH 0.05	0	4	½ semester

Placement and Population

The MATH 0.01-MATH 0.02 sequence is designed to prepare students for the CMAT, and all students who score below 25 on this test are placed here. Those who score below 14 on the arithmetic portion enroll in MATH 0.01; the remainder enroll in MATH 0.02.

Thereafter, students are placed in remedial mathematics according to field of study, high school preparation, and score on a locally-prepared test. In all cases, satisfying the CUNY pro-

ficiency requirement is a prerequisite. Education majors are expected to have mastered the content of 2½ years of high school mathematics; otherwise, they are responsible for MATH 0.03 and MATH 0.04. The same is true of students in certain mathematics-related curricula not requiring calculus. Students planning to continue into calculus are responsible for the content of the MATH 0.03-MATH 0.04-MATH 0.05 sequence.

By these criteria, about one-half of Brooklyn College's entering students are placed in mathematics remediation, with the majority in the CMAT-preparatory sequence.

Methods

All remedial mathematics classes are conducted in a traditional lecture-recitation format.

Support Services

The chief support service in remedial mathematics is a walk-in workshop, open 48 hours a week. The workshop is staffed by two faculty members and a number of student tutors, both graduate and undergraduate. Resources include individualized computer-generated problem sets, based on the student's own pattern of errors in previous work.

Exit Criteria; Retesting

In MATH 0.01, the exit criterion is a 20-question test, patterned after the arithmetic portion of the CMAT, except that it is not multiple-choice. Students who score under 14 on this test are required to repeat the course.

In MATH 0.02, the student is retested on the CMAT, and also completes a departmental final examination. Passing the course is contingent on satisfactory performance on both tests.

Exit from the other three remedial courses depends on instructor judgment, along with performance on tests administered at the end of the course. Since each of the courses is a half-semester, courses completed in mid-semester end with a test prepared by the individual instructor, but those completed at the actual end of the semester are provided with uniform final examinations prepared by the department.

Faculty

About 40 percent of Brooklyn's remediation sections are taught by Mathematics Department faculty, with the remainder divided between adjuncts and out-of-department faculty, chiefly from Physics and Chemistry. Two members of the mathematics faculty supervise about 200 tutor-hours a week in return for six hours each of released time.

Response to the CMAT

Prior to the introduction of the CMAT, mathematics remediation was voluntary for most students, and the program was relatively small. The CMAT, with its implications for mandatory remediation, more than doubled the size of the program; providing the necessary courses and organization was a challenge to the Mathematics Department, and indeed to the entire College. At present, it is felt that the test is appropriate.

THE REMEDIAL MATHEMATICS PROGRAM AT THE CITY COLLEGE OF NEW YORK

Course Structure and Content; Administration

The basic remedial mathematics course at the City College of New York is MATH 51: Arithmetic and Elementary Algebra. Thereafter, the courses fall into two sequences: MATH 52 and MATH 53 for liberal arts students, and MATH 54, MATH 55, and MATH 56 for students in scientific and technical areas. (Nursing majors are exempt from MATH 56.) All remedial mathematics courses are administered by the Mathematics Department. Except for three small, innovative SEEK programs, SEEK and non-SEEK students attend the same sections. (See SEEK Programs, below.) Descriptions of the six courses follow.

Liberal Arts Sequence

MATH 51: Arithmetic and Elementary Algebra is designed specifically to cover the content of the CUNY Mathematics Assessment Test (CMAT); that is, arithmetic and selected topics from elementary algebra.

MATH 52: Applications of Mathematics includes logical analysis of problems and processes, flow charting, use of hand calculators, rounding and significant figures, graphing, problem solving, and interpreting charts and graphs. It also covers additional topics in algebra and geometry, including the Pythagorean theorem and distance formula.

MATH 53: Modern Mathematical Tools covers scientific notation, introduction to set theory, elementary probability and statistics, and an introduction to computers and programming.

Science and Technology Sequence

MATH 54: Essentials of Algebra includes topics from algebra, including rational expressions, polynomials and factoring, exponents, and radicals.

MATH 55: Further Essentials of Algebra includes quadratic equations, logarithms, functions, and systems of equations. It also covers conic sections and geometric figures, both plane and solid.

MATH 56: Trigonometry and Precalculus includes functions and graphs, trigonometry, mathematical induction, sequences and series, and an introduction to calculus.

Additional information is provided in the table below.

Course	Credits	Hours	Duration
MATH 51	0	4 + 1 lab	1 semester
MATH 52	1	3 + 1 lab	1 semester
MATH 53	1	3 + 1 lab	1 semester
MATH 54	0	4 + 1 lab	1 semester
MATH 55	1	4 + 1 lab	1 semester
MATH 56	3	4 + 1 lab	1 semester

Placement and Population

Placement within City College's remedial mathematics program is based on three factors: field of study, high school record, and score on a 70-question test, the City College Mathematics Placement Test (CCMPT). This test consists of the entire CMAT, augmented by 30 questions in such areas as intermediate algebra, trigonometry, and analytic geometry. Placement is determined as shown in the table below.

CCMPT Score	Placement	
Under 23	MATH 51	all students.
23-32	Exempt	liberal arts students with one year each of algebra and geometry.
	MATH 52	non-exempt liberal arts students.
	MATH 54	students in technical and scientific areas.
33-40	Exempt	liberal arts students with one year each of algebra and geometry.
	MATH 53	non-exempt liberal arts students.
	MATH 55	students in technical and scientific areas.
41-48	Exempt	liberal arts and education majors.
	MATH 56	students in technical and scientific areas, except nursing students.
49 or over	Exempt	all students.

Because this placement procedure is based on the overall CCMPT score rather than the CMAT score alone, one consequence is that students may be exempted from the basic remedial course, MATH 51,

even if they score below 25 on the CMAT. If these students require additional mathematics, they are placed as described above; the assumption is that they will be able to pass the CMAT at the end of their first mathematics course, whatever it may be. However, this still leaves a group of liberal arts students who may fail the CMAT and nonetheless be exempted from all further mathematics on the basis of their majors and high school records. These students are encouraged to register for MATH 51 or MATH 52, even if they are not required to take it, in order to increase their chances of demonstrating proficiency on the CMAT when they again attempt it.

On the basis of the above placement procedure, about one-half of the entering freshman class at City require mathematics remediation. The same proportion--although not necessarily the same individuals--score below 25 on the CMAT. Of these, a substantial number show strength in other portions of the CCMPT, so that only about 30 percent of incoming freshmen are placed in MATH 51.

Methods

In the MATH 51-52-53 sequence, instruction is chiefly by means of conventional lecture-discussion. A mathematics laboratory is available to students who need additional help, but in the main the use of the lab is optional. (See Support Services, below.) In the MATH 54-55-56 sequence, each course consists of three separate modules; students are graded on each module, repeating it if necessary. Here, too, lab support is available.

A few students bypass their classes altogether, working independently in the lab. Independent study may also be used to prepare for the CMAT.

Support Services

The major support service in mathematics at City College is the math lab. The lab is open from 9 to 6 every weekday except Friday, when it closes earlier; it also remains open two evenings a week. The chief resources of the lab are supplementary texts, practice tests, and extensive tutoring. The tutors are upper-division students familiar with the content of the courses; other staff include a full-time supervisor and, upon occasion, members of the faculty. Although attendance at the lab is in general optional, an instructor may specifically assign a student to extra work there, in which case attendance is checked.

Exit Criteria; Retesting

In MATH 51, the CMAT is the sole exit criterion. Students who meet the CUNY criterion by scoring 25 or over are considered to have completed the course. Those who score between 22 and 24 are allowed to go on to the next course in the remedial sequence. The remainder are required to repeat MATH 51.

In other remedial courses, exit criteria consist of appropriate locally-prepared tests. Students who were not required to register for MATH 51 but who did not originally demonstrate proficiency on the CMAT have the opportunity to retake it once a semester under the auspices of the Office of Institutional

Research. This office reschedules the examinations and notifies eligible students by mail.

Faculty

About 40 percent of the remedial sections are taught by full-time mathematics faculty, and another 20 percent by adjuncts with a mathematics background. Of the remainder, half are taught by full-time non-mathematics faculty, chiefly from the sciences, and half by graduate students in science and engineering. Virtually everyone in the Mathematics Department either teaches remediation or helps staff the lab.

Special SEEK Programs

The SEEK department has established three small innovative programs for SEEK students.

Minority Assistance Program in Engineering and Science (MAPES). This program is open to students interested in science, engineering, or architecture who initially place into MATH 54 or MATH 55, and who demonstrate adequate reading and writing skills. Such students are in the top third of the SEEK population. One purpose of the program is to provide extra mathematics support to relatively capable science-oriented SEEK students. MAPES features block programming, small classes, and extra counseling. The program can accommodate 20 to 25 students per semester.

SEEK Nursing Assistance Program (SNAP). This program is designed for nursing students who are weak in mathematics. About half the students initially place into MATH 51, and half into MATH 54. Like MAPES, SNAP features block programming, small classes, and extra counseling. The capacity of the program is 20 to 25 per semester.

The Pre-51 Program for very weak SEEK students is open to students who score 15 or less on the CCMPT. The program consists of small-group tutoring, usually by graduate students. Capacity is 15 to 20 students per semester.

MAPES and SNAP use syllabi prepared by the Mathematics Department and otherwise follow departmental specifications. The classes are staffed by Mathematics Department faculty who request the assignment.

Response to the CMAT

When the CMAT was introduced, faculty were concerned that arithmetic would replace topics considered more important. However, this has not been the case. At present the test is generally considered appropriate to its purpose. Faculty report that the algebra portion of the CMAT is less demanding than the locally-prepared placement test previously in use. On the other hand, they find arithmetic more difficult to teach than algebra. The view has been expressed that if the CMAT improves the caliber of students transferring from two-year colleges, then the entire CUNY system will benefit.

THE REMEDIAL MATHEMATICS PROGRAM AT HUNTER COLLEGE

Course Structure and Content; Administration

The remedial mathematics sequence at Hunter College consists of two courses. The first, administered by the Mathematics Department, is:

> MATH 001: Arithmetic and Topics in Algebra. This course includes the arithmetic of whole numbers, fractions, decimals, ratio and proportion, and percent, as well as selected topics from elementary algebra. Some basic concepts from statistics are also included. Problem solving is stressed throughout the course.

The second course is administered by the Physics Department, but is actually perceived as a divisional course within the Division of Sciences and Mathematics. It may be described as follows:

> PHYSC 001: Problem Solving in the Sciences includes scientific notation, unit conversion, measurement, estimation, algebra, graphs, word problems and translations, functional analysis, trigonometry, and geometry, etc. Its purpose is to provide the student with the necessary problem-solving skills and scientific literacy required for entry-point courses in the sciences.

The Academic Skills Department, which is responsible for administering courses for SEEK students, offers its own equivalents of these two courses. These are discussed later in this report.

Further information on the two non-SEEK courses appears below.

Course	Credits	Hours	Duration
MATH 001	0-3	3	1 semester
PHYSC 001	0-3	4	1 semester

Credit is variable because Hunter allows credit for remedial work only to lower-division students, and then with the following restrictions:

> No more than eight credits in all remedial areas together will be accepted toward graduation.
>
> No more than three credits in math-physical science remediation will be accepted toward graduation.

Placement and Population

All students who score below 25 on the CUNY Mathematics Assessment Test (CMAT) are placed in MATH 001. Separate scores on the two halves are not taken into account. However, a "rapid exit channel," permitting exit from the course in four weeks, has been designed for marginally remedial students; this is discussed in greater detail under Exit Criteria, below.

Students must pass the CMAT before being admitted to PHYSC 001. Thereafter, the criterion for admission is a score of 29 or less on parts 2 and 3 of the California Achievement Test, Form V. (The maximum possible score is 50.)

On the basis of these placement procedures, about 40 percent of all entering students enroll in MATH 001, and about one-half require PHYSC 001.

Because the two courses are administered by different departments of the college, they will be discussed separately.

MATH 001: Arithmetic and Topics in Algebra

Methods: MATH 001 is a self-paced program. For each of the eight tests in the course, students are advised to:

1. Take and grade a locally-prepared sample test. All questions on this test are keyed to specific course objectives. For each objective missed, the student works through additional text passages and practice problems identified on the test.
2. Take the actual test by the specified deadline date. This test, too, is classified by objective. For each objective, there are three questions, of which at least two must be answered correctly.
3. A student is given credit for all objectives he passes; retests are administered on each missed objective in class on a specified retest day. Students work with tutors and printed resources

until they feel that they have mastered the missed objectives. Completed supplementary problems are submitted as evidence of additional study. Each retest has four problems for each objective. The student must answer three out of four problems on the retest to pass an objective.

In this way, the individual student paces himself through the course. Student pacing is controlled through two sets of deadlines, one for taking a test the first time and one for retests. The CMAT is used as a final examination and is required of all students; however, it does not serve as the sole exit criterion. (See Exit Criteria, below.)

Support Services: The chief support service in MATH 001 is the Mathematics Learning Center, with its staff of college laboratory technicians, lab assistants, and hourly proctors. Classes, including the important tutoring component, take place in this Center, and the students may use it for tutoring and study whenever it is open--about 45 hours a week. Other resources available in the Learning Center include printed worksheets and sample tests, and supplementary texts. Instructors give review lectures before test deadlines and students are urged, though not required, to attend.

Exit Criteria; Retesting: To complete MATH 001, students must pass eight tests; four in arithmetic and four in algebra; students must pass tests on all eight to complete the course. However, it

is also necessary to pass the CMAT, which is administered to all students as a final examination. Students who pass the eight tests but fail the CMAT make arrangements to retake it, including re-registration for MATH 001 if necessary. Students who pass the CMAT without having passed all eight tests are thereafter exempted from retaking it, but receive no final grade for the course. They are designated "proficiency satisfied."

MATH 001 students who pass the eight tests and pass the CMAT receive a final grade of CR. Students who have completed at least half the course (but not all of it) may receive a one-time grade of R. Students whose attendance or study is inadequate receive the usual grades of WU (unofficial withdrawal), NC, or more rarely F. The department has the option of dropping from the course students who miss more than six class meetings.

A previously mentioned "rapid-exit channel" allows qualified students to complete MATH 001 within four weeks and enter PHYSC 001 the same semester. These students receive special tutoring, and the staff cooperate in the rapid administration and grading of tests. About 10 percent of entering students take advantage of this option.

Faculty: A single full-time member of the Mathematics Department serves as coordinator of the MATH 001 program. All other faculty are adjuncts. The large contingent of undergraduate and graduate tutors are usually recruited from Hunter's student population.

Response to the CMAT: Both student and faculty responses to the CMAT have been favorable.

PHYSC 001: Problem-Solving in the Sciences

Methods: PHYSC 001 is offered in two different modes: lecture-tutorial and recitation. In the lecture-tutorial mode of instruction, the student spends two hours a week in a large lecture and the remaining two hours in tutorial sections. Tutorials take place in specially designed rooms, capable of accommodating five or six small groups, each consisting of a half-dozen students and a tutor. An instructor, whose duties include supervising tutors, administering quizzes, keeping records, and handling any problems which may arise, is also present. The course content is presented during the large lectures; in tutorial sessions, questions are answered and problems, homework and quizzes are reviewed.

Several recitation sections of PHYSC 001 are offered both in the day and in the evening. The recitation format is the typical combination of lectures, discussions, and problem solving found in many college mathematics and science courses.

Support Services: In addition to the tutoring in the lecture-tutorial format, one-to-one extra tutoring may be scheduled for students in need on a regular basis. Instructor office hours (approximately 15 hours a week), as well as weekly and Saturday tutoring workshops, are available to any PHYSC 001 student on a walk-in basis. Other resources include an extensive problem work-

book; all previous exams and answer keys are on file in the school library.

Exit Criteria: In PHYSC 001 the exit criterion is a uniform examination covering the entire syllabus. This test is initially given at the end of the 11th week of the semester. Students who do not receive a grade of C or better on this early exit examination are required to take the final, which also covers the entire term's work; again, the passing grade is C. First-time students who do not succeed in obtaining a grade of C, but who have been attending regularly, participating in tutoring (if any), taking quizzes, and submitting assignments, receive a one-time grade of R; however, they must re-register and repeat the entire course. A repeating student who does not succeed in obtaining a C grade on either exit exam is given an F or NC grade. Poor attendance and work may also result in a student receiving a WU or F grade. The department has the option of dropping from the course students who miss more than eight class meetings.

Faculty: A single full-time member of the instructional staff serves as coordinator of PHYSC 001 and the large-group lectures are usually given by a member of the Physics Department. For the rest, faculty are adjuncts who often hold graduate degrees in science. Tutors are recruited from the College's own student body. New tutors are required to attend tutor training workshops.

Reaction to the CMAT: Since a condition for admission to PHYSC 001 is passing the CMAT, the faculty have no direct experience with the test. However, there is a sense that students are better prepared for PHYSC 001 since the test has been introduced.

The SEEK Program in Remedial Mathematics

Course Content and Structure; Administration

Hunter's Academic Skills Department (ACSK) offers two remedial mathematics courses.

ACSK 011: Elementary Mathematics is equivalent to the non-SEEK course, MATH 001.

ACSK 012: Intermediate Mathematics is equivalent to the non-SEEK course, PHYSC 001.

Additional information on these two courses appears below.

Course	Credits	Hours	Duration
ACSK 011	0-3	4	1 semester
ACSK 012	0-3	4	1 semester

As in the non-SEEK courses, credit is governed by the college policy of allowing credit only to lower-division students, allowing a maximum of eight remedial credits overall toward graduation, and allowing a maximum of three in math-physical science remediation.

Placement and Population

Placement procedures are the same as for the corresponding non-SEEK courses. By these criteria, about two-thirds of entering SEEK students are placed in ACSK 011 (usually followed by ACSK 012), and about one-third directly in ACSK 012.

Methods

Each of the two remedial courses has been broken down into five modules; students pass a module by completing a departmental test with a score of 80 percent or better. Tests may be retaken in equivalent forms up to three times. Of the four hours per week allowed for each course, three are spent in conventional classroom lecture-discussion; the fourth is devoted to small-group problem sessions.

The five modules in ACSK 011 are: (1) arithmetic; (2) percent, ratio, and proportion; (3) introduction to algebra; (4) polynomials; and (5) solving more complex equations. The modules in ACSK 012 are: (1) scientific notation and "guesstimating"; (2) unit conversion and the metric system; (3) word problems, including ratio, proportion, and percent; (4) graphs and functional relations; and (5) elements of geometry and trigonometry.

Support Services

The chief support service in ACSK 011 and ACSK 012 is a laboratory maintained by the Department of Academic Skills. The center provides locally-prepared worksheets, tutoring by appointment, and testing. The tutors themselves are tested to make sure they understand the course content; some are former remedial students.

Exit Criteria; Retesting

In ACSK 011, the CUNY Mathematics Assessment Test (CMAT) is used as a final examination. However, only those students who have completed all five modules with a passing average are permitted to take the examination. Students who score below 19 are required to repeat the course. Those who score between 19 and 24 on the final are permitted to prepare independently for a retest, which is administered within a month; if they fail a second time, they re-register for ACSK 011. In ACSK 012, the exit criterion is a final examination prepared by the Department; students who fail this examination re-register for the course.

Faculty

ACSK remedial mathematics courses are staffed chiefly by full-time SEEK faculty, with adjuncts hired as needed. On average, about 20 percent of all sections are taught by adjuncts. A single full-time faculty member coordinates both courses.

Response to the CMAT

Student response to the CMAT is satisfactory except that questions on graphing are perceived as inappropriate.

Faculty response is generally favorable. However, it has been suggested that the CMAT would be more useful if the arithmetic component could be used for diagnosis. It has been suggested that five questions be provided in each of four areas, with the part scores reported.

THE REMEDIAL MATHEMATICS PROGRAM AT JOHN JAY COLLEGE OF CRIMINAL JUSTICE

Course Structure and Content; Administration

The remedial mathematics program at John Jay College of Criminal Justice consists of four courses, as described below:

MATH 100: Basic Mathematical Skills covers arithmetic, including operations with whole numbers, fractions and decimals, ratios and proportions, and percents.

MATH 095: Basic Mathematical Skills is equivalent to MATH 100, but is intended for SEEK students.

MATH 103: Elements of Modern Mathematics I includes topics from elementary algebra including operations with signed numbers, polynomials, and rational functions; linear equations; and introduction to exponents, and literal equations.

MATH 104: Elements of Modern Mathematics II. Topics include systems of equations in two variables; rational exponents; quadratic equations and functions; complex numbers; mathematical models; inequalities; theory of equations; and exponential and logarithmic functions.

MATH 103 and 104 are planned as a sequence. The two courses together are equivalent to the non-remedial 3-credit course, MATH 105, Modern Mathematics, and may be applied toward the college's mathematics requirement. All courses are administered by the Mathematics Department except for MATH 095, which is administered jointly wih the SEEK department.

Additional information on the remedial courses appears below:

Course	Credits	Hours	Duration
MATH 095	0	4	1 semester
MATH 100	0	3	1 semester
MATH 103	0	3	1 semester
MATH 104	3*	3	1 semester

*Given upon completion of the MATH 103-MATH 104 sequence.

Placement and Population

The chief placement instrument at John Jay is a locally-prepared 50-question multiple-choice test consisting of ten questions in arithmetic, 20 in elementary algebra and word problems, and 20 in more advanced topics. Students scoring below 13 on this test are usually placed in MATH 100 (or MATH 095), although the individual test papers are reviewed for evidence of specific weakness in arithmetic. A score of 13-23 indicates placement in MATH 103, although again, individual papers are reviewed for areas of weakness. Scores roughly between 23 and 42 lead to placement in the non-remedial course, MATH 105. Students are not placed directly in MATH 104, but move there after completion of MATH 103.

By these criteria, about two-thirds of entering non-SEEK freshmen place into either MATH 100 or MATH 103, with the majority in MATH 103. Among SEEK students, almost all place into MATH 095.

The CUNY Mathematics Assessment Test (CMAT) is administered by the Counseling Department and is not a factor in placement.

Methods

All John Jay remedial mathematics courses are taught in a conventional mode, combining lectures, discussions, and problem solving. Emphasis throughout is on the appreciation of mathematical concepts rather than on technical manipulation.

In MATH 095, which meets four hours a week, the fourth hour is devoted to problem solving, including a review of homework problems.

Support Services

The chief support service in mathematics is the Mathematics Resources Center. This area serves students in all mathematics courses, remedial and college-level. Tutoring is available on a walk-in basis. Additional resources includes special audio-tapes, filmstrips, booklets, videotapes, and manipulative devices. The Center is staffed by four part-time technicians and a number of student tutors; it is open about 25 hours a week.

Separate tutoring facilities are maintained by the Dean of Students and by SEEK.

Exit Criteria; Retesting

Exit criteria for all John Jay remedial mathematics courses include performance in class, including class tests, and a uniform departmental final examination. In general, a grade below 40% on this final exam implies a grade of F in the course; however, the department chairman will review individual cases when indicated.

Responsibility for re-administration of the CMAT rests with the Counseling Department, which maintains the records and calls in students for retesting when necessary. Very few cases have arisen in which students will complete the John Jay remedial sequence and nonetheless continue to score below 25 on the CMAT. In such cases, students have been advised to work independently.

Faculty

In assigning faculty to sections of remedial mathematics, individual preferences are taken into account. However, such preferences are not binding on the department. About half of all sections are taught by adjuncts. It has not been necessary to retrain out-of-department faculty to teach remediation.

Response to the CMAT

Because the Mathematics Department uses its own tests as placement and (in part) exit criteria, and does not even administer the CMAT, there is little awareness of the CUNY test. In general, it is felt that the level of the CMAT is below that considered appropriate for John Jay students.

THE REMEDIAL MATHEMATICS PROGRAM AT LEHMAN COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at Lehman College consists of five courses, all administered by the Mathematics Department.

MAT 004: Basic Mathematics I covers the arithmetic content of the CMAT; that is, whole numbers, fractions, decimals, ratio and proportion, and percent.

MAT 005: Basic Mathematics II covers selected topics from elementary algebra, including signed numbers, solving first-degree equations, operations with polynomials, and simple factoring. It is designed to cover the algebra content of the CMAT.

MAT 008: Basic Mathematics III is a short review of arithmetic and algebra topics which appear on the CMAT. It is designed for students who narrowly missed the CMAT proficiency criterion.

MAT 016: Preliminary Mathematics I includes topics from elementary algebra, including first-degree equations, polynomials and rational expressions, positive and negative integral exponents, systems of linear equations (treated graphically and algebraically), and graphing quadratic functions.

MAT 017: Preliminary Mathematics II presents topics from analytic and synthetic geometry, including axiomatics, graphing, and the distance formula.

Further information on these courses appears below.

Course	Credits	Hours	Duration
MAT 004	0	3	1 semester
MAT 005	1	4	1 semester
MAT 008	0	1	1 semester
MAT 016	1	4	1 semester
MAT 017	2	4	1 semester

It should be noted that a substantial revision of this course structure is planned for the 1981-1982 academic year.

Placement and Population

The CMAT is used for placement into MAT 004, MAT 005, and MAT 008 as follows:

MAT 004 A score of 0-24 on the entire CMAT and a score of 0-13 on the arithmetic portion.

MAT 005 A score below 22 on the entire CMAT and a score of 14 or better on the arithmetic portion.

MAT 008 A score of 22, 23, or 24 on the entire CMAT and a score of 14 or better on the arithmetic portion.

MAT 016 Designed for students who have demonstrated proficiency on the CMAT, but who have not taken a year of high school algebra.

MAT 017 Designed for students who have demonstrated proficiency on the CMAT, but who have not taken a year of high school geometry.

The five courses are sequential; the first three are designed specifically to prepare students for the CMAT, while the last two address students' needs beyond this level.

By these criteria, between one-half and two-thirds of entering Lehman students are placed in the remedial program.

Methods

All courses are taught in a conventional lecture-discussion form. Except for final examinations in MAT 004, MAT 005, and MAT 008, where the CMAT is used, all tests are prepared by individual instructors.

Support Services

The chief support service for non-SEEK students consists of limited tutoring by the faculty, who use their regular office hours for the purpose. Worksheets are sometimes prepared by individual faculty for use by their own sections. However, a math lab will be opened during the 1981-1982 academic year.

The SEEK program includes a tutoring service for SEEK students only.

Exit Criteria; Retesting

Re-administration of the CMAT is the responsibility of the Mathematics Department. The test is used as the exit criterion for students in MAT 004, MAT 005, and MAT 008. Students who score below 25 are placed according to the initial placement criteria already described, while those who score 25 or higher move directly to MAT 016 or MAT 017 if needed.

In MAT 016 and MAT 017, exit criteria are at the discretion of the individual instructor.

Faculty

About 60 percent of all sections are taught by full-time faculty. Of these, half are taught by regular mathematics faculty and half by faculty from other departments, chiefly Geology and Education. Mathematics faculty may volunteer to teach remediation or they may be assigned; in general, they are needed to teach more advanced courses in computer science and other areas.

Remaining sections are taught by adjuncts.

Response to the CMAT

Concern has been expressed that the CMAT does not completely meet the needs of any group of students. For some, much of it is irrelevant; on the other hand, it is inadequate for those who plan to continue in science or other math-related fields.

THE REMEDIAL MATHEMATICS PROGRAM AT QUEENS COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at Queens College consists of four courses, as described below. The first, MATH 01, is administered by the SEEK Department; the others are administered by the Mathematics Department. However, SEEK students attend separate sections, in which the SEEK Department helps select faculty and develop methods of instruction.

MATH 01: Basic Arithmetic Skills. This course covers the arithmetic of whole numbers, fractions, ratios, and proportions, decimals, and percent. It also provides an introduction to selected topics from elementary algebra and geometry. Note: The non-SEEK equivalent of this course, MATH 02, is listed in the catalog but has not been offered for several years, due to lack of demand.

MATH 04: Elementary Algebra covers the content of a ninth-year algebra course, including signed numbers, solutions of equations, exponents and radicals, operations with algebraic expressions, and a brief survey of basic topics from geometry.

MATH 06: Intermediate Algebra with Trigonometry includes topics from eleventh-year mathematics, including inter-

mediate algebra, trigonometry, and analytic geometry. Apart from its remedial function, this course serves as the departmental precalculus course. It may also be used to satisfy the College's basic skills requirement in mathematics.

MATH 05: Studies in Mathematics, formerly MATH 150, parallels MATH 06, except that certain calculus-oriented topics (including logarithms, trignometry, conic sections, and fractional exponents) are replaced with an introduction to statistics. This course is intended for students interested primarily in satisfying the mathematics requirement.

Additional information on these courses appears below.

Course	Credits	Hours	Duration
MATH 01	0	4	1 semester
MATH 02 (Has not been offered for several years)	0	3	1 semester
MATH 04	2	4-6	1 semester
MATH 05	2	5-6	1 semester
MATH 06	2	5-6	1 semester

Placement and Population

All entering students are required to take the Queens College Mathematics Placement Test (QCMPT), a 40-question test covering elementary and intermediate algebra as well as trigonometry. In the non-SEEK program, this computer-graded and analyzed test deter-

mines placement in remedial mathematics, although students who score below 25 on the CMAT are automatically placed in MATH 04. In the SEEK program, students who score below 25 on the CMAT are placed in MATH 01 or MATH 04, depending on the scores on the two parts of the test and on an individual evaluation. Non-SEEK students requiring work in arithmetic are identified by their instructors during the first week of the semester.

By these criteria, 40 percent of entering non-SEEK students and about 95 percent of entering SEEK students require remediation, with the majority of both groups placing into MATH 04.

Methods

All instruction in the remedial mathematics courses is by conventional lecture, discussion, and problem solving. SEEK sections incorporate some practice time into the class meeting.

Support Services

The chief support service in the Queens College remedial mathematics program is a mathematics laboratory. Resources include: videotapes covering the content of MATH 01, MATH 02, MATH 04 and MATH 06; computer-generated assignments which the students may request or the instructors require; faculty (who volunteer an hour a week of their time), and student tutors. The lab is open about 40 hours a week.

SEEK students may also use the resources of the SEEK tutoring center, which is open all day every weekday and provides tutoring by appointment in all subject areas.

Exit Criteria; Retesting

In all remedial mathematics courses, the exit criterion is a combination of faculty judgment and a grade on a uniform departmental final examination. Re-administration of the CMAT is the responsibility of the College's Academic Skills Office, not the Mathematics Department.

Faculty

Regular Mathematics Department faculty are assigned to teach remedial courses as part of their regular teaching load, and about two-thirds of all non-SEEK sections are taught by adjuncts. In the SEEK program, special faculty are hired by the Mathematics Department with the approval of the SEEK department; these faculty teach only SEEK sections. (A few faculty teach only MATH 01; these are hired directly by SEEK). About half of the SEEK sections are taught by adjuncts. It has not been necessary to use out-of-department faculty.

Response to the CMAT

Because the level of Queens College non-SEEK students is relatively high, the CMAT has had little impact on the College. Queens has its own mathematics requirements for graduation, and these go considerably beyond the level of the CMAT. Within the SEEK program, there is a greater awareness of the test, which is seen to be appropriate to its curriculum.

THE REMEDIAL MATHEMATICS PROGRAM AT THE COLLEGE OF STATEN ISLAND

Course Structure and Content; Administration

The remedial mathematics program at the College of Staten Island (CSI) consists of four courses, administered by the Mathematics Department.

MTH 00P: Proficiency Mathematics. This course is designed to prepare weak students for the CUNY Mathematics Assessment Test (CMAT). It covers the arithmetic of whole numbers, fractions, and decimals; percent; an introduction to graphs and charts, and topics in elementary algebra.

MTH 001: Basic Mathematical Skills provides a review of elementary algebra and continues with topics in elementary algebra through quadratic equations. It is designed to prepare less weak students for the CMAT and for subsequent mathematics courses.

MTH 002: Basic Algebra, a continuation of MTH 001, includes the content of a traditional intermediate algebra course. Emphasis is on applications of algebraic techniques to practical situations.

NOTE: MTH 002 is a remedial half-semester course. The second half of the semester is devoted to the non-remedial

course MTH 115, Trigonometric and Logarithmic Functions, which, like MTH 002, is required of students in mathematics-related fields.

MTH 107: Medical Dosage Calculations, the arithmetic of medical dosages, is required of nursing students.

Further information on the four courses appears below.

Course	Credits	Hours	Duration
MTH 00P	0	3	1 semester
MTH 001	1	4	1 semester
MTH 002	1	4	½ semester
MTH 107	0	2	1 semester

Placement and Population

Placement in the CSI remedial mathematics program is based on score on the CUNY Mathematics Assessment Test (CMAT), supplemented by a local test, consideration of the student's field of study, and occasionally a personal interview.

All students who score 17 or less on the CMAT are placed in MTH 00P. Since this course is designed as preparation for the CMAT, a re-administration of the test comprises the final examination.

Students in technical pre-engineering, business, and science curricula (math-related curricula) who score between 18 and 24 on the CMAT are placed in MTH 001. Nursing students in this range are placed in MTH 107 while concurrently auditing MTH 00P to prepare for the CMAT. All other students who score between 18 and 24 have their choice of enrolling in MTH 001 or the less demanding

MTH 00P, either of which can prepare them for the test. About half elect each option.

However, students in math-related curricula must continue in the remedial sequence through MTH 002, regardless of where they initially enter. Hence the population of MTH 001 consists of three groups:

Students in math-related curricula who initially scored 17 or less on the CMAT, and for whom MTH 001 is a successor to MTH 00P.

Students in math-related curricula who initially scored between 18 and 24 on the CMAT, and for whom MTH 001 is an entry-point course.

Students in other curricula (except nursing) who scored between 18 and 24 on the CMAT and elected MTH 001 rather than MTH 00P.

This placement procedure is further modified in two ways. After the first week, MTH 001 students take a locally-prepared arithmetic test; those who score below 80 percent are transferred to MTH 00P. Also, students in math-related curricula with marginal CMAT scores may be interviewed, and their high school records reviewed, to ensure appropriate placement.

Among students who initially pass the CMAT, those in math-related curricula are normally placed in MTH 002; however, they may be exempted if their CMAT scores and high school records

indicate it. Nursing students are placed in MTH 107; liberal arts students have a 12-credit math-science requirement which must include at least three credits of mathematics, exclusive of MTH 002.

By the above criteria, about 20 percent of entering freshmen place into MTH 00P and about 40 percent into MTH 001.

Methods

The remedial mathematics courses at CSI are taught traditionally, using lectures, discussions, and problem solving. MTH 001 is divided into two units; the first is a review of elementary algebra, and the second consists of topics in intermediate algebra. The two units are independent; a student who fails a unit repeats it in the next half-semester. A similar organization is used in the MTH 002-MTH 115 sequence.

Support Services

The chief support service at CSI is a mathematics laboratory, open from 9 A.M. to 5 P.M. three days a week, and until 9 P.M. on two days. Resources include one-to-one tutoring by peer tutors or faculty, supplementary texts, locally-prepared worksheets and sample tests, and audiovisual resources including the ModuMath Arithmetic Videotapes. Faculty members may be assigned to the lab one or more hours a week to fill out their teaching schedules.

Exit Criteria; Retesting

MTH 00P uses two distinct exit criteria: the CMAT and a class grade based on departmental examinations. The CMAT is used as a

final examination, and students who pass it automatically pass the course. However, those who fail may receive a grade of Incomplete or F, depending on whether they have or have not performed satisfactorily in class. Students receiving F must reregister for MTH 00P; those who receive Incomplete are advised to audit it during the next semester and retake the CMAT thereafter. In neither case may the student proceed to MTH 001 without having passed the CMAT.

Passing the CMAT, however, is not the exit criterion from MTH 001 and MTH 002. Passing these courses depends on class performance, including departmental tests. Although MTH 001 students must take the CMAT at the end of the course, they may continue on to MTH 002 even if they do not score 25 on it. MTH 002 students do not take the CMAT as part of their course, but may sign up for it through the CSI Office of Testing, which administers the test several times a semester. Although CSI has a number of non-transfer two-year curricula, passing the CMAT is a graduation requirement of all students.

Faculty

All CSI mathematics faculty teach remedial courses; adjuncts cover between one-third and one-half of all sections. Upon occasion, faculty from technological areas are assigned to teach mathematics remediation; they receive no special training and pose no problems. In the past, certain administrators have also asked to be assigned a section, chiefly to familiarize themselves with the operation of the program.

Response to the CMAT

In the opinion of the coordinator of the remedial mathematics program, the CMAT was imposed with insufficient notice and the content is inappropriate for many CSI students. Prior to the CMAT, CSI had developed its own placement instrument, geared to the modular system of instruction then in use. The coordinator expressed the view that this approach was more effective than the one which has replaced it.

THE REMEDIAL MATHEMATICS PROGRAM AT YORK COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at York College consists of the following courses:

MATH 010: Elements of Algebra and Geometry I. This course covers the basic concepts of arithmetic, algebra, and geometry. It is also designed to strengthen computational skills.

MATH 011: Elements of Algebra and Geometry II. A continuation of MATH 010, it includes rational expressions, simultaneous equations in two variables, graphs, word problems, and properties of geometric figures.

At this point, the program branches. Science and technology students take:

MATH 101: Algebra and Trigonometry. This course covers precalculus topics such as linear and quadratic equations, logarithms, exponents, graphing, trigonometric functions, and solution of triangles.

Liberal arts students usually follow the MATH 010-011 sequence with:

MATH 180-181: Introduction to Statistics and Probability with Algebra I and II. This is a two-semester sequence, partly remedial and partly college-level. In addition to selected remedial topics, it covers algebra, trigonometry, probability, and statistics. This sequence may be used to satisfy York's four-credit mathematics requirement. Better-prepared remedial students in non-technical areas may enter MATH 180 directly.

There are two additional courses in the program:

MATH 020: Algebra and Geometry is an accelerated version of MATH 010-011, covering the same content in a single semester.

MATH 100: Elements of Algebra and Geometry is a separate form of MATH 010-011, intended for SEEK students.

While non-SEEK sections of remedial mathematics courses are administered by the Mathematics Department of the College, SEEK sections are administered jointly by the Mathematics and SEEK Departments. Syllabi and texts are determined by the Mathematics Department. However the classes are taught by SEEK mathematics instructors, who are selected by the Mathematics Department in consultation with the director of the SEEK program.

Further information on the remedial courses appears below.

Course	Credits	Hours	Duration
MATH 010	1	3	1 semester
MATH 011	1	3	1 semester
MATH 101	1	4	1 semester
MATH 180	2	4	1 semester
MATH 181	2	4	1 semester
MATH 020	1	4	1 semester
MATH 100	1½	6	1 semester

Placement and Population

York College's Mathematics Department uses a complex placement procedure based on high school record, college major, and score on the CUNY Mathematics Assessment Test (CMAT). A summary of the procedure appears on pages 48 and 49. Nominally, SEEK students attend special SEEK sections of MATH 180-181. Actually, practical difficulties often intervene, so there is rarely an entirely non-SEEK section of either course.

One consequence of York's placement procedure is that a few students--those who score only 23 or 24 on the CMAT, but who have completed intermediate algebra in high school--are placed directly into college-level mathematics courses despite the fact that they have not satisfied CUNY proficiency criteria. If these students complete approximately 40 college credits without having satisfied proficiency, they are urged to join a special workshop designed to prepare them for the test.

MATHEMATICS PLACEMENT CRITERIA FOR FALL 1980

Below, in the column labeled "major," the categories mean:

CATEGORY 1. Science, Mathematics, Pre-engineering, Medical Technology or Environmental Health.
CATEGORY 2. Business (Cooperative Education)
CATEGORY 3. Accounting and Economics
CATEGORY 4. All others, including Occupational Therapy

Footnotes appear on next page.

HIGH SCHOOL MATH	MAJOR	CMAT SCORE	MATH PLACEMENT
	Category 1	32 or above	101
		23-31	020
		0-22	010*
	Category 2	28 or above	180
		18-27	020
		0-17	010*
No academic math**	Category 3	28 or above	180
		18-27	020
		0-17	010*
	Category 4	28 or above	180
		18-27	020
		0-17	010*
Completed 9th-year Algebra or 10th-year Geometry	Category 1	18 or above	101
		0-17	020
	Category 2	18 or above	180
		0-17	010*
	Category 3	18 or above	180(1)
		0-17	010*
	Category 4	18 or above	180(1)
		0-17	010*
Completed Intermediate Algebra	Category 1	18 or above	101
		0-17	020
	Category 2	25 or above	115
		0-24	180
	Category 3	25 or above	190 or 115
		0-24	180
	Category 4	23 or above	111* or 150 or 115 or 190
		0-22	180

Completed 11th-year Math (Intermediate Algebra and Trig.)	Category 1	80% or higher in 11th-year math	121(2)
		If grade is below 80% use:	
		25 or above	121(2)
		0-24	101
	Category 2	23 or above	115
		0-22	180
	Category 3	23 or above	190 or 115
		0-22	180
	Category 4	23 or above	111* or 115 or 150 or 190
		0-22	180

FOOTNOTES:

1. If a student wants to take Calculus, assign him/her to 101 if the test score is 23 or above; otherwise as shown.

2. Some geology majors are permitted to avoid taking Calculus and can take Math 111 to complete their Major requirements. Such students can, if they wish, be given Math 111.

3. If a student can specify that he/she wishes to major in Allied Health, but cannot say which area, follow "Category 1" placement.

4. If a student knows that he/she wishes to major in Science, Mathematics, Pre-engineering, or Allied Health, but cannot be more specific, follow "Category 1" placement.

5. If a student can specify that he/she wishes to major in Business but cannot be more specific, follow "Category 3" placement.

6. If a student can specify that he/she will not major in Science, Business, Accounting or Economics, but cannot be more specific, follow "Category 4" placement.

7. If a student cannot specify major in <u>any</u> way, use "Category 4" placement.

* MATH 100 for SEEK Students.

** Students whose records on CUNY tape show no high school mathematics should be interviewed by a counselor to see if this is really true.

By virtue of the above placement procedure, about 60 percent of York's entering students are enrolled in mathematics remediation. Some of this group may have passed the CMAT; conversely, a few students are exempted from remediation even though they have marginally failed the CMAT.

Methods

Remedial mathematics courses are taught in a conventional lecture-discussion mode. This reflects the view of the department chairman that individual instructors should retain automony in their classrooms. Students with difficulties may be referred to the audiovisual and tutoring center, known as MILLY. (See Support Services, below.)

Support Services

The major support service in mathematics is a learning laboratory known as MILLY (Mathematics-Media Individualized Learning Laboratory at York), originally funded by a CUNY Chancellor's Grant. MILLY is housed in two connecting classrooms. It provides not only tutoring, but also audiovisual resources in basic mathematics, elementary algebra, topics in precalculus, and selected topics from beginning calculus. Staff includes one CETA employee, one undergraduate mathematics major classified as a college assistant, technical and clerical support as needed, and several work-study students majoring in mathematics. In addition, each faculty member, except the chairman, is required to provide one hour per week in the facility. Utilization is described as "heavy."

Apart from MILLY, York's mathematics program has computer-assisted instruction available seven hours per week. Terminals connect with the central CUNY computer and use commercial materials prepared by Patrick Suppes. Additional materials for CAI are available in a microcomputer laboratory, on Apple computers.

Exit Criteria; Retesting

Exit criteria in remedial mathematics courses are determined by the individual instructor, and conventional letter grades are used. The department has deliberately avoided offering the CMAT in the remedial classroom or making it part of the final examination in any course, lest the course in question be perceived as having been designed around the test.

However, re-administration of the CMAT remains the responsibility of the Mathematics Department. Three tests per semester are scheduled: two, a month apart, during daytime "club hours"; and the third, on a Sunday during intersession, for evening and weekend students. Students are notified of the retesting schedule through their mathematics classes or appropriate public channels within the College. These notification procedures are currently being studied and refined. Students preparing for retests are provided with review sheets and other study materials prepared by members of the department. In addition, the workshop mentioned earlier is available for study and review.

Faculty

All fourteen full-time mathematics faculty teach remedial classes; adjuncts are brought in as needed. SEEK sections are

taught by four Mathematics Department faculty hired with the approval of both the SEEK and Mathematics Departments. All remedial instructors, adjunct and full-time, have degrees in mathematics.

Response to the CMAT

Mathematics faculty have a practical involvement with the CMAT because they help administer it, both initially and upon retesting. There is some sense that the algebra component of the test is irrelevant to the needs of liberal arts students. However, the arithmetic component is considered appropriate and generally beneficial to the College as well as the students.

THE REMEDIAL MATHEMATICS PROGRAM AT THE BOROUGH OF MANHATTAN COMMUNITY COLLEGE

Course Structure and Content: Administration

The remedial mathematics program at the Borough of Manhattan Community College (BMCC) consists of four courses, all administered by the Mathematics Department. The four courses are:

MAT 010: Basic Mathematics I. This course covers the arithmetic of whole numbers, fractions, decimals, proportion, and percent, as well as signed numbers and simple linear equations.

MAT 011: Basic Mathematics II. This is a compressed version of MAT 010, covering the same material in half the class time.

MAT 051: Elementary Algebra. Equivalent to a ninth-year algebra course, this course includes such topics as algebraic representation, signed numbers, factoring, solution of linear equations, Cartesian coordinates, graphing, and simultaneous linear equations in two variables.

MAT 012: Basic Arithmetic and Algebra combines the content of MAT 010 and MAT 051 in a single course.

Further information on the four courses appears below.

Course	Credits	Hours	Duration
MAT 010	0	6	1 semester
MAT 011	0	3	1 semester
MAT 051	0	4	1 semester
MAT 012	0	6	1 semester

Placement and Population

Placement into the BMCC remedial mathematics program is based on a combination of curriculum and score on the CUNY Mathematics Assessment Test (CMAT), with the two halves (arithmetic and algebra) considered separately. Placement into arithmetic is determined as shown below.

Score on CMAT Part I (arithmetic)	Course
0 - 7	MAT 010
8 -14	MAT 011 or 012 (see below)
15 -20	Exempt

With respect to algebra, only students in transfer curricula (liberal arts and business administration) or in fields specifically requiring the content are mandated to take remediation. Of this "algebra" group, those who score between 0 and 11 on Part II (algebra) of the CMAT are usually placed in MAT 051 (following arithmetic remediation, if this is also necessary); those who score 12 or better are exempt. Students who need both arithmetic and algebra but who score between 12 and 14 on Part I of the CMAT--thereby missing the cut-off marginally--are placed in MAT 012,

which provides the opportunity to complete the entire remedial obligation in one semester. Finally, even students outside the "algebra" group are advised that they should work toward passing the CMAT, since they might ultimately decide to continue in CUNY beyond the sophomore year.

One consequence of basing placement on part scores is that occasionally a student passes the CMAT overall but nonetheless places into remediation. Such students are interviewed by the coordinator or departmental chairman, and are usually exempted.

On the basis of the above placement procedure, about one-half of all entering freshmen place into arithmetic remediation, while another one-quarter place directly into one of the two remedial algebra courses.

Methods

Over the past few years, the BMCC remedial mathematics program has shifted from self-pacing toward conventional classroom instruction, the chief reason being curtailed funding. In arithmetic, however, the Mathematics Department continues to support the principle of mastery learning: that is, each student is expected to master each topic in the course at the 80 percent level. Since mastery learning is difficult to implement within the framework of the traditional lecture-discussion format, substantial use is made of a mathematics laboratory. (See Support Services, below.)

Other courses are taught in a conventional lecture-discussion format.

Support Services

The primary BMCC support service in remedial mathematics is a learning center at the 67th Street building, where most of the remedial mathematics courses are offered. The chief resource is individual or small-group tutoring. Typically, a student who fails one of the classroom arithmetic tests goes to the learning center for additional study; the learning center is also responsible for retesting.

Since funding for tutors has been obtained either through the CETA program or through other temporary lines, the continuation of the learning center is by no means certain.

Exit Criteria; Retesting

In the two arithmetic courses, MAT 010 and MAT 011, the Mathematics Department maintains standards through the use of a locally-prepared uniform final examination; other department tests are also available to faculty who wish to use them.

In the two algebra courses, MAT 051 and MAT 012, the CMAT is the exit criterion. In order to pass the course, the student is required to score 25 or better.

Faculty

Virtually all full-time BMCC mathematics faculty, nearly half of whom have doctorates, teach remedial courses; adjuncts, usually experienced instructors with advanced degrees in math-related fields, are hired as needed. In Spring 1981, about 40 percent of

all sections were taught by adjuncts. The departmental coordinator takes responsibility for the orientation of new and adjunct faculty.

Response to the CMAT

Student response to the CMAT has been favorable. Faculty feel that both the content and level are appropriate. However, the opinion has been expressed that from a psychometric point of view, each half of the CMAT, used independently, may be too short to be reliable.

THE REMEDIAL MATHEMATICS PROGRAM AT BRONX COMMUNITY COLLEGE

Course Structure and Content; Administration

The remedial mathematics sequence at Bronx Community College (BCC) consists of three courses, all administered by the Mathematics Department. The three courses are:

MTH 05: Basic Concepts of Mathematics I. This course offers topics from arithmetic, elementary algebra, and geometry. The topics include operations with rational numbers, numerical geometry, equations, polynomials, rational algebraic expressions, and graphing.

MTH 06: Basic Concepts of Mathematics II covers selected topics from intermediate algebra, coordinate geometry, and trigonometry.

MTH 07: Selected Topics in 11th-Year Mathematics. The material of this course is selected from relations and functions, quadratic equations, systems of equations, right triangles, trigonometry, coordinate geometry, and radicals.

Further information on the three courses appears below.

Course	Credits	Hours	Duration
MTH 05	0	5 class 1 lab	1 semester
MTH 06	0	5 class 1 lab	1 semester
MTH 07	0	4	1 semester

Placement and Population

Placement into remedial mathematics is based on a combination of the CUNY Mathematics Assessment Test (CMAT), high school courses, and a personal interview. All students who score below 25 on the CMAT are placed in MTH 05. Among those who score 25 or better, placement is determined as shown below.

Science, engineering, technology, and transfer business students without 11th-year mathematics take MTH 06. Those students who score 25 or better and have competency in 11th-year mathematics take college-credited mathematics courses.

Among education, social science, and art students, those with 2½ years or more of traditional high school mathematics may enroll in college-level courses; others are placed in MTH 07.

Secretarial studies, nursing, and non-transfer business students take a non-remedial course, MTH 12 (Introduction to Mathematical Thought).

These guidelines are also used for placing students who complete MTH 05.

More than 90 percent of entering BCC freshmen score below 25 on the CMAT and therefore enroll in MTH 05.

Methods

BCC mathematics classes are conducted in a recitation format with emphasis on the discovery method. MTH 05 is divided into two half-semester modules, one emphasizing arithmetic and the other algebra; within each module the same recitation format is employed.

Support Services

The chief support service in mathematics is a math lab open from 9 A.M. to 8 P.M. five days a week. (On weekends, tutoring is available outside the lab through grant funds.) It is staffed by full-time faculty, who are assigned there several hours per week, college assistants, and peer tutors. It offers locally-prepared written materials, audiotapes used in conjunction with class texts, and programmed instruction materials. In addition, tutor-staffed mini-sessions are provided in January and June for students close to completion of a remedial course. Typically, each mini-session is attended by about 200 students, most of whom do in fact complete the course.

More elaborate instructional materials, including computer terminals for practice and drill, films, and videotapes, are available at the BCC library.

Exit Criteria; Retesting

The CMAT is incorporated into the final examination in MTH 05; failing the CMAT means repeating at least one module of the course. However, local examinations and other criteria are also used. Local criteria, including performance in class and on individually prepared tests, are used in MTH 06 and MTH 07.

Faculty

All BCC mathematics faculty teach remediation. In addition, out-of-department faculty are being utilized. These faculty are selected by their own departments on the basis of seniority, but must be approved by the Mathematics Department. They are also required to attend a retraining program designed by the Mathematics Department chairman. In Spring 1981, six faculty from the Biology Department and one from Modern Languages were used in this way, most of them teaching two sections of remediation.

Response to the CMAT

The coordinator reported that many of the mathematics faculty at BCC feel that the level of the CMAT is too low to justify its exclusive use as an exit criterion from MTH 05. There is also a sense that the test content is a "smorgasbord" which cannot be equated with any one course in the traditional high school curriculum. Some also feel that "minimum," as defined by CUNY, may one day be interpreted as a maximum in the eyes of others.

THE REMEDIAL MATHEMATICS PROGRAM AT MEDGAR EVERS COLLEGE

Course Structure and Content; Administration.

The remedial mathematics program at Medgar Evers College consists of two courses, both administered by the Mathematics Department of the college.

MTH 002: Arithmetic Through Algebra. This course consists of arithmetic, including operations with whole numbers, fractions, decimals, ratios and proportions, and percents, as well as selected topics from elementary algebra. Exponents, scientific notation, and measurement are also included. Computational skills are developed by application of the principles of elementary algebra; emphasis is placed on applications and word problems.

MTH 131: College Mathematics I is a continuation of algebra, including factoring; rational numbers; equations and inequalities; introduction to radicals, exponents, and roots; real and complex numbers; functions; systems of linear equations, including graphing; quadratic equations; and logarithms. Emphasis is on applications and word problems.

Additional information on the two courses appears below.

Course	Credits	Hours	Duration
MTH 002	0	4	1 semester
MTH 131	2	4	1 semester

Placement and Population

Placement in the two remedial mathematics courses is based on score on the CUNY Mathematics Assessment Test (CMAT). Students who score below 25 on this test are placed in MTH 002. Those who score between 25 and 34 inclusive are placed in MTH 131. The remainder are exempted from mathematics remediation. On the basis of these criteria, about three-quarters of the entering students place into MTH 002, and about 20 percent into MTH 131.

Methods

MTH 002 is currently taught using a combination of lectures, tutors, and CAI. The professor lectures for 30 minutes covering basic content and concepts. This is followed by 45 minutes of practice and drill on the computer-assisted instructional equipment, utilizing computerized lessons prepared by Dr. Patrick Suppes for the Computer Curriculum Corporation. During the practice sessions, tutors are available to help students who encounter difficulties. Classes are held in the computer lab, and each student is assigned to a specific section, as with any class. The program is funded by a federal grant.

A study has shown that this individualized approach improves motivation and retention. The proportion of students successfully completing the course is also increased. It should be noted that despite the individualization, the course is not self-paced; students who might have difficulty keeping up with the class are expected to spend extra time each week in the lab.

MTH 131 is taught through conventional lecture-discussion, audiovisual and CAI. Two sections each use lecture, audio-visual, and CAI media for classroom instruction.

Support Services

For students in the CAI program, the lab itself serves as a support service, insofar as they may attend whenever it is open. Staffing includes one college laboratory technician and a contingent of tutors; usually there are four or five available at any one time. The lab is open about 40 hours per week, including two evenings and several hours on Saturday.

Students in MTH 131 can arrange for tutoring by appointment through the College's tutoring center.

Exit Criteria; Retesting

In MTH 002, the exist criterion is either scoring 25 or better on the CMAT or scoring 70 or better on the department's own final examination. Students who fail the course are assigned to a special individualized section.

Exit from MTH 131 is based on class tests and a grade of 70 or better on a departmental final examination. The CMAT is re-administered to all MTH 131 students who have not previously passed it; those who score below 25 receive a grade of Incomplete and are encouraged to prepare for the test via independent study.

Faculty

Except for two evening/weekend sections, only full-time faculty teach in the CAI program. In MTH 131, adjuncts are used

as needed; during the last few semesters they have been employed in up to one-third of the sections. Out-of-department faculty do not teach mathematics remediation.

Response to the CMAT

Both faculty and students have accepted the CMAT as appropriate to its purpose.

THE REMEDIAL MATHEMATICS PROGRAM AT HOSTOS COMMUNITY COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at Hostos Community College consists of two separate sequences, one for liberal arts students and the other for students in science and technology. Both are administered by the Mathematics Department.

Liberal Arts Sequence

MATH 1600: Remedial Mathematics. This course includes basic operations with integers, fractions, and decimals, as well as a treatment of exponents, ratio and proportion, and percent.

MATH 1612: Algebra for Non-Science Students. This course covers elementary algebraic operations, polynomials, linear equations, and an introduction to coordinate geometry.

Science and Technology Sequence

MATH 1604: Basic Mathematical Skills. This course includes all the topics of MATH 1600 (see above), along with measurement, the metric system, scientific notation, and greater emphasis on verbal problems.

MATH 1622: Elementary Algebra covers operations with rational algebraic expressions, factoring polynomials, simplifying algebraic expressions, linear and quadratic equations with graphing, and simultaneous linear equations.

Further information on the four courses appears below.

Course	Credits	Hours	Duration
Liberal Arts Sequence			
MATH 1600	1	6	1 semester
MATH 1612	2	6	1 semester
Science and Technology Sequence			
MATH 1604	1	6	1 semester
MATH 1622	2	6	1 semester

Placement and Population

Placement in the Hostos remedial mathematics program is determined by score on the CUNY Mathematics Assessment Test (CMAT) which, since Hostos is committed to bilingual instruction, is administered in both English and Spanish. Students who score 25 or better are exempted from all mathematics remediation. Of the remainder, those who score 13 or less on the arithmetic portion of the test enroll in arithmetic remediation, MATH 1600 or MATH 1604, usually followed by algebra; those who score between 14 and 20 on the arithmetic portion go directly into algebra. Students who do well in the algebra portion of the CMAT but demonstrate weakness in arithmetic are required to take only arithmetic remediation.

Typically, about 90 percent of entering freshmen require mathematics remediation, and about 90 percent of these require remediation in both arithmetic and algebra. This population includes virtually all students who fail the CMAT.

Methods

Each of the remedial mathematics courses meets for 6 hours per week. Of these, 4½ are used for a traditional lecture-discussion class. The other 1½ are conducted by a college assistant who reviews the content and goes over assigned problems.

Because of HCC's status as a bilingual college, all courses are offered in both English and Spanish. For Fall 1980, the breakdown was as follows:

Course	Number of Sections	
	English	Spanish
MATH 1600	3	7
MATH 1612	3	1
MATH 1604	5	3
MATH 1622	4	4

Support Services

The chief support service at Hostos is a bilingual mathematics lab. Until Spring 1981, this facility was housed in a small room and provided only tutoring, printed resources (chiefly locally prepared review sheets), and some retesting. At that time, Hostos took over a large, modern building, and the math lab was substantially expanded. It now consists of one large room, two smaller,

soundproofed seminar rooms (separated from the larger one by glass partitions), and an anteroom. The facility is open from 9 A.M. to 8:00 P.M. five days a week. Staffing consists of a bilingual college lab technician with a master's degree in mathematics, along with a contingent of college assistants and work-study students who serve as tutors. For the present, the lab continues to offer tutoring, practice and drill from printed resources, and retesting; however, plans are being developed for computer-assisted practice and drill. Microcomputers are located in the lab for use by students enrolled in the computer science offerings.

Exit Criteria; Retesting

Hostos remedial courses are independent of the CMAT; grading is based on traditional criteria such as performance on instructor-designed tests, contributions in class, and grades on assignments.

CMAT retests are available once a semester and are publicized in mathematics courses. Students sign up in class, although the test itself is usually given on a Saturday. Most students retake the CMAT at the end of their second remedial course, but some complete their remedial requirement without ever having passed it. For this group, review sessions are held for a few weeks prior to the retest. Since Hostos has a six-credit mathematics requirement, most students follow their remedial work with a college-level course.

Faculty

All Hostos mathematics faculty teach remedial courses; adjuncts are brought in as needed. The percentage of sections taught by adjuncts varies between 50 and 60 percent.

Response to the CMAT

Faculty reaction to the CMAT has been mixed. There is general agreement that science students should meet and even exceed the CUNY standard. With respect to liberal arts students, however, there is some sense that they are being required to study material which is at once demanding and irrelevant to their curricula.

THE REMEDIAL MATHEMATICS PROGRAM AT KINGSBOROUGH COMMUNITY COLLEGE

Course Structure and Content; Administration

The remedial mathematics sequence at Kingsborough Community College consists of four courses, all administered by the Mathematics Department. The four courses are described below. The first two comprise a one-year remedial sequence. The third is a one-semester alternative for students whose remedial needs are primarily in algebra. The fourth is equivalent to eleventh-year high school mathematics and is designed for students whose curricula require the content.

MAT R1: Basic Mathematics. This course covers the arithmetic of whole numbers, fractions, decimals, and percentage. It is designed to cover the arithmetic content of the CUNY Mathematics Assessment Test (CMAT).

MAT R2: Introductory Mathematics is an introductory algebra course designed to cover the algebra content of the CMAT.

MAT 01: Elementary Algebra offers signed numbers, linear equations, factoring, graphing, and other topics traditionally covered in a ninth-year elementary algebra course.

MAT 03: Eleventh-Year Mathematics covers quadratic equations and functions with graphing, linear inequalities, exponents and logarithms, and other topics normally covered in an eleventh-year algebra course, (not equivalent to precalculus).

Further information on the courses appears below.

Course	Credits	Hours	Duration
MAT R1	0	4	1 semester
MAT R2	0	5	1 semester
MAT 01	0	4	1 semester
MAT 03	0	4	1 semester

Placement and Population

The primary placement instrument in Kingsborough's remedial mathematics program is the CMAT. Students who score 14 or less are placed in MAT R1; those with scores between 15 and 19 register for MAT R2. Students who score between 20 and 24 are not required to register for remediation; instead they are advised to utilize such resources as the tutoring services, the media center, and the Math Skills Laboratory.

MAT 01 is intended for students who are competent in arithmetic (which Kingsborough defines as a score of 11 or better on the first half of the CMAT) and who would benefit from a more comprehensive treatment of elementary algebra than that provided in MAT R2. Students who score between 20 and 24 on the CMAT may also be advised to register for this course. MAT 03 is designed for

students in mathematics-related curricula who have not completed eleventh-year mathematics in high school.

On the basis of these criteria, about two-thirds of entering freshmen place into R1 or R2. Only one or two sections of MAT 01 are offered each semester, and several of MAT 03.

Methods

In MAT R1 and MAT R2, one class meeting a week is held in the Mathematics Skills Laboratory (see Support Services, below); the remaining meetings are conducted by conventional lecture-discussion. MAT 01 and MAT 03 are also conducted conventionally.

Support Services

Kingsborough has a college-wide tutoring program in all areas, including remedial mathematics. In addition, the department maintains a Mathematics Skills Laboratory, providing locally-prepared practice materials and sample examinations and tutoring by former CETA tutors, now supported by the college or through grants. Students in MAT R1 and MAT R2 are required to be in the lab at a specific hour and attendance is taken. Students are not permitted to work exclusively in the lab (in lieu of attending classes), although they may use it at times other than their scheduled hour.

Kingsborough also maintains an extensive library of videotapes in mathematics and other academic areas. Most of the mathematics materials have been locally prepared.

Exit Criteria; Retesting

In MAT R1, students take a departmental final examination; other tests are at the discretion of the instructor. They are also permitted to retake the CMAT; those who pass are excused from MAT R2.

In MAT R2, the CMAT is used as the exit criterion. Students who fail to meet minimum proficiency criteria are required to re-register for the course.

MAT 01 and MAT 03 use instructor-prepared tests and final examinations. However, those students in MAT 01 who did not originally pass the CMAT are required to retest upon exit from the course.

It should also be noted that those students whose initial CMAT scores were between 20 and 24 and who prepared for the retest via independent study are permitted only one retest on this basis. If they again fail to meet proficiency criteria, they are required to register for MAT R2.

Faculty

All full-time mathematics faculty teach remedial courses. In addition, faculty from the Physical Sciences Department are being retrained for this purpose. Adjuncts are hired as needed and currently cover about one-third of all sections.

Response to the CMAT

The original effect of the CMAT was to expand Kingsborough's remedial mathematics requirement from a one-semester course empha-

sizing arithmetic to a two-semester sequence covering both arithmetic and algebra. The transition period was somewhat disrupting; at present, however, the test appears to be satisfactory.

THE REMEDIAL MATHEMATICS PROGRAM AT LAGUARDIA COMMUNITY COLLEGE

Course Structure and Content; Administration

The remedial mathematics sequence at LaGuardia Community College consists of two courses, both administered by the Mathematics Department. The two courses are:

MAT 098: Basic Mathematics I. This course includes arithmetic of whole numbers, fractions and decimals, as well as word problems and the metric system.

MAT 099: Basic Mathematics II. This course provides a review of MAT 098 along with units on elementary algebra and measurement of area and perimeter.

Further information on the two courses appears below.

Course	Credits	Hours	Duration
MAT 098	1	4 class 1 lab	1 quarter
MAT 099	1	3 class 1 lab	1 quarter

Following this sequence, most remedial students register for a non-remedial 3-credit course, MAT 110. (The chief exception is a group of about 100 secretarial science students per semester.) MAT 110 includes additional topics in algebra, such as products and factors, quadratic equations, and coordinate geometry. In addition, it presents for the first time three topics which

appear on the CUNY Mathematics Assessment Test (CMAT): graphing points and lines, graphing the equation of a straight line, and solving simple simultaneous linear equations. These topics were formerly taught in MAT 099. The change was made because it was felt that MAT 099 already offered too much material. However, it also reflects the conviction of the Mathematics Department that the remedial program should be independent of the CMAT.

Placement and Population

The initial screening for LaGuardia's remedial mathematics program is the CMAT. Those students who score 13 or less are automatically placed in MAT 098, while others who do not meet minimum CUNY proficiency criteria (25 or above) are usually placed in MAT 099. However, some students in this group may be permitted to take locally-prepared "waiver tests," depending on their total CMAT score, separate scores in arithmetic and algebra, and high school record. Satisfactory performance on the waiver test permits the student to move up one course in the mathematics sequence. One consequence of this policy is that students who marginally miss the CUNY cut-off of 25 may nonetheless be allowed to go directly into the non-remedial course, MAT 110. (It should be noted that "waiver" students, like all others, are credited with having passed the CMAT only if they do in fact pass an official form of the test.)

On the basis of the above placement procedure, approximately 75 percent of entering freshmen require mathematics remediation.

Methods

Both MAT 098 and MAT 099 are taught in a modified classroom approach, supplemented by the use of a math lab. (See Support Services, below.) Within the class, instruction follows a traditional lecture-discussion format. The instructor proceeds at the slowest possible pace consistent with completing the course in a single quarter. Students who can work more quickly or who need extra time are encouraged to use the lab, either to supplement or (more rarely) to replace the class.

The position of the Mathematics Department is that the use of the hand-held calculator should be an integral part of the teaching of basic mathematics to college students. To this end, the department has developed its own text for use in the MAT 098 course. This text stresses problem-solving strategies and assumes the use of the calculator by each student in the class.

A similar text for MAT 099 is in the planning stage.

Support Services

The chief support service at LaGuardia is a mathematics lab, open from 8 A.M. to 8:30 P.M. weekdays (except Fridays, when it closes earlier) and from 10 A.M. to 1 P.M. on Saturdays. Staffing includes a full-time coordinator who holds a master's degree in mathematics, two technicians, and a number of student tutors. Instructors may also spend an hour or two a week helping to staff the lab. Resources include supplementary texts and other printed materials, audiovisual resources (including the Modu-Math Arithmetic Videotapes as well as locally-prepared videotapes covering

the content of the CMAT), and manipulative materials. Plans are being developed to introduce microcomputers for practice and drill. Apart from its function as an instructional agency, the lab serves as a testing center; in the two basic remedial courses all retesting is done in the lab, while in MAT 110, both first-time testing and retesting are conducted there, except for the final examination.

Exit Criteria

Exit criteria from the two remedial courses, MAT 098 and MAT 099, consist solely of local criteria such as quizzes, uniform midterm and final examinations, and classroom performance. Uniform examinations ensure that individual faculty adhere to the prescribed syllabus. Re-administration of the CMAT is not part of either course, except that students not planning to continue with MAT 110 are given the CMAT after the completion of MAT 099.

The CMAT is administered around the middle of MAT 110. (It will be recalled that several test topics are presented for the first time in this course.) However, passing the course is not contingent upon passing the CMAT.

One consequence of this procedure is that certain students who plan to meet the CUNY criterion have not done so by the time they finish their required mathematics. These include (1) students who have no mathematics requirement beyond MAT 099 but who score below 25 when the test is readministered at the end of the course, and (2) those who pass MAT 110 without having passed the CMAT. Students in the first group are usually urged to register

for MAT 110, even if they are not required to do so. In any event, students in either group can study the CMAT content in the math lab, from printed or audiovisual resources. Retesting these students is the responsibility of the Basic Skills Office, which schedules college-wide retests and notifies eligible students. This procedure has been deliberately adopted to emphasize the independence of the remedial program from the CMAT.

Faculty

All mathematics faculty teach remediation. Adjuncts are brought in as needed; this accounts for between 25 and 40 percent of all sections. The adjunct staff includes one or two regular science faculty who have elected to teach remedial mathematics on an overload basis.

Response to the CMAT

Originally, the Mathematics Department had misgivings about the use of the CMAT because it was a locally-prepared test lacking appropriate psychometric data. However this is no longer a concern, for several reasons. First, such data is gradually becoming available. Second, the test appears to be appropriate to its purpose. Finally, the CMAT has had relatively little impact on the content and structure of LaGuardia's remedial mathematics program.

However, the Mathematics Department has expressed its convictions that another form of the CMAT should exist for retest purposes to accommodate the use of the hand-held calculator.

THE REMEDIAL MATHEMATICS PROGRAM AT NEW YORK CITY TECHNICAL COLLEGE

Course Structure and Content; Administration

The remedial mathematics sequence at New York City Technical College consists of two courses, both administered by the Department of Developmental Skills. The two courses are:

DM 050: Basic Mathematics for College Students is a beginning course designed specifically for the non-science career student. The emphasis is on the fundamental operations of arithmetic and the solution of simple linear equations. Topics include: the system of whole numbers including applications, factoring, rational numbers, decimal fractions, percents, elementary equation solving, and formula evaluation.

DM 060: College Preparatory Mathematics is a beginning course designed specifically for liberal arts students and students in the science-oriented technology programs. The emphasis is on fundamental operations of algebra with well-integrated arithmetic applications including verbal problems. Topics include: the language of algebra, signed numbers, basic operations with polynomials, linear equations, special products and factoring, operations with fractions, graphing linear equations, ratio and proportion, the real number system, and simple quadratic equations.

Further information on the two courses appears below.

Course	Credits	Hours	Duration
DM 050	0	4	1 semester
DM 060	0	5	1 semester

It should be noted that several topics from the CUNY Mathematics Assessment Test (CMAT) are deferred until a college-level course. MA 175 (Fundamentals of Mathematics), is administered by the Mathematics Department.

Placement and Population

Placement into the remedial courses is based on two factors: CMAT score and field of study.

DM 050 is intended primarily for students in certain non-technical curricula, including commerce, accounting, marketing, graphic arts, human services, and secretarial sciences. Placement is based only on the arithmetic portion of the CMAT, regardless of whether the overall score is above or below 25. (It should be noted that these students are not required to retake the CMAT as a condition for graduation.) The arithmetic cut-off is 14 in some curricula and 13 in others. In addition, any student who scores below 7 in the arithmetic portion of the test is placed here, regardless of curriculum.

DM 060 is intended for students in liberal arts, allied health fields, and certain technical curricula, provided they have scored at least 7 in the arithmetic portion of the CMAT. (Otherwise they are placed in DM 050, as already noted.)

Placement is corroborated by a locally-prepared test administered during the first class meeting. If there are marked discrepancies between a student's scores on the two tests, his placement is reconsidered on the basis of high school record, personal interview, etc.

By virtue of the above placement procedure, about one-half of all entering freshmen are placed in DM 060, and another 20 percent in DM 050.

Methods

In the main, DM 060 is taught via conventional lecture-discussion. However, an experimental approach has been introduced in six sections at the Voorhees campus. The class begins with a locally-prepared videotaped lecture; the remainder of the hour is devoted to problem solving with the instructor and a tutor.

In DM 050, individualization has been achieved through the use of a semi-programmed text. This is supplemented by class lectures and problem solving.

Support Services

The chief support service is a walk-in laboratory, providing tutoring in all areas of mathematics. The lab is open from noon to 8 P.M. two days a week and from noon to 9 P.M. two days; it is closed Fridays and weekends. Apart from tutoring, the lab provides locally-prepared review sheets and is experimenting on a limited scale with computer-assisted instruction by means of Apple microcomputers.

Exit Criteria; Retesting

In both DM 050 and 060, students take a departmentally prepared final examination. Other exit criteria are at the discretion of the individual faculty.

Only liberal arts students are required to pass the CMAT as a condition for graduation, although others are advised that they should take it if they anticipate transferring to a four-year college at any point. Students are usually advised to postpone the test until they complete one college-level mathematics course; in the case of liberal arts students, this is usually MA 175, the course mentioned earlier. Students themselves take the initiative in applying for a retest; they report to the Office of Academic Testing, Placement, and Advisement, which is responsible for administering the CUNY tests at NYC Technical and which schedules re-examinations.

Faculty

About 60 percent of remedial mathematics classes are staffed by full-time faculty in the Developmental Skills department, and about 40 percent by adjunct instructors. Faculty from the regular mathematics department are used if they request the assignment, but not otherwise. Faculty from other departments have been used only as adjuncts.

Response to the CMAT

The consensus is that the CMAT is satisfactory, and no negative reactions were reported.

THE REMEDIAL MATHEMATICS PROGRAM AT QUEENSBOROUGH COMMUNITY COLLEGE

Course Structure and Content; Administration

The remedial mathematics program at Queensborough Community College consists of three courses, administered by the Mathematics Department. The first is designed specifically for nursing students. The second is the basic remedial course, covering the content of the CUNY Mathematics Assessment Test (CMAT). The third is intended primarily for science and business students. The three courses are described below.

MA 009 Mathematics for Nursing Students. This course includes the arithmetic of whole numbers, decimals, fractions and percent, as well as formulas, unit conversion, and medical dose calculation.

MA 010: Basic Mathematical Skills. The course consists of four modules:

(1) Arithmetic.

(2) Signed numbers and simple operations with polynomials; basic geometry.

(3) Linear equations with graphing; word problems; solving simultaneous linear equations by elimination and graphing.

(4) Factoring, rational expressions, and applications.

MA 020: Intermediate Mathematics. This course consists of four modules, viewed as following the four of MA 010, and numbered 5 through 8.

(5) Trigonometry and linear functions.

(6) Linear inequalities, solution of simultaneous equations by determinants, quadratic functions.

(7) Exponents, logarithms, and scientific notation.

(8) Radicals, complex numbers, the quadratic formula, variation and proportion.

Further information on the three courses appears below.

Course	Credits	Hours	Duration
MA 009	0	3	1 semester
MA 010	0	5	1 semester
MA 020	0	5	1 semester

Placement and Population

Placement testing is the responsibility of the Office of Testing and Institutional Research (OTIR). In mathematics, all students take a 74-question test, the Omnibus Placement Test (OPT). Responses are analyzed by computer, with special computer programs for students in certain business curricula or in nursing. In general, the principle has been to place students in the first module from which they fail to exempt, after which they proceed consecutively through their required sequence. Liberal arts students are not required to go beyond MA 010; MA 020 is required only of those in transfer curricula in business or science. Tech-

nical students in non-transfer curricula take MA 010 if indicated; thereafter, they proceed with special college-level courses designed to meet their needs.

Until Spring 1981, the OPT was entirely locally prepared and the CMAT was administered separately. As of Spring 1981, the OPT was revised so that the CMAT comprises 40 of the 74 questions. Under these circumstances the OPT can no longer be used for placement into MA 020, and a separate local test has been prepared for this purpose.

Since the OPT is more demanding than the CMAT, fewer than 3 percent of all entering freshmen pass the first while failing the second. These students are advised individually.

On this basis, about two-thirds of entering students place into remedial mathematics, although fewer than half fail the CMAT.

Methods

Ideally, MA 010 and MA 020 are taught in modular form. All four modules in a given course meet in the same time slot, with each lasting 3½ weeks. At the end of this period, all students take module tests; those who pass move on to the next module in the sequence, while those who fail repeat the module.

However, this poses scheduling problems, since it presupposes a large student body and the availability of four rooms and four instructors simultaneously. Therefore, only two-thirds of the sections are actually taught in this way; the remainder are taught conventionally. Within each module, classes are also taught through conventional lecture-discussion.

Support Services

Queensborough maintains a mathematics laboratory, currently staffed by a HEO employee and seven peer tutors. Some locally-prepared videotapes in algebra are available for use in the lab, and the ModuMath Arithmetic Videotapes can be used in the college library. (The format of the ModuMath tapes precludes their use with the equipment in the lab.)

Because of these limited resources, Queensborough's remedial mathematics faculty have a major responsibility for tutoring and retesting during their office hours.

Exit Criteria; Retesting

In the modular sections of MA 010 and MA 020, students are required to pass each module in the course with a grade of 70 percent or better. Tests are prepared by the individual instructors, although the department has prepared prototype examinations to indicate the appropriate content and level of difficulty. In these sections there is no final examination.

In conventional sections, instructors use their own criteria. Some choose a modular format with four tests but no final examination; others adopt a traditional approach, giving tests at their discretion and requiring a final.

All students who fail the CMAT are requested to repeat it. The retest normally takes place after completion of MA 010. Re-administration is the responsibility of OTIR; tests are scheduled at least twice a semester and eligible students notified by mail. Thereafter, responsibility for passing the

CMAT rests with the individual student, although the form letter stresses the importance of the retest.

Faculty

All full-time mathematics faculty teach at least one section of remedial mathematics, and many teach two. Between 10 and 20 percent of the sections are covered by adjuncts.

Response to the CMAT

The Mathematics Department continues to feel that the level of the CMAT is too low for the needs of this college.. In particular, they feel that it would not suffice as preparation for mandated college-level courses.

Tables

1. Basic Mathematics Program Chart: Senior Colleges

2. Basic Mathematics Program Chart: Community Colleges

Appendices

A. Description of CUNY Mathematics Assessment Test (CMAT)

B. Interview Questionnaire

C. Resource Persons

TABLE 1

BASIC MATHEMATICS PROGRAM CHART
(Unless noted, courses are in mathematics departments.)

SENIOR COLLEGES

	COURSE NUMBER	CREDITS	HOURS	CONTENT	PLACEMENT PROCEDURES	EXIT CRITERIA
BARUCH	MATH 0100	0	3	Arithmetic; topics from elementary algebra.	0-10 on arithmetic portion of CMAT.	For all courses: faculty judgment; instructor or departmental final examination.
	MATH 01	0	4*	Topics from elementary algebra.	Below 60% on appropriate section of departmental test; also high school record. Or student elects course.	
	MATH 02	0	4*	Further topics from elementary algebra.	Below 60% on appropriate section of departmental test; also high school record and field of study.	
	MATH 03	0	4*	Systems of linear equations, including graphing.	Same as MATH 02.	
	MATH 04	0	4*	Introduction to intermediate algebra.	Same as MATH 02.	
	*Half-semester course.					
BROOKLYN	MATH 0.01	0	6*	Arithmetic.	0-24 on CMAT and 0-13 on arithmetic portion.	Over 13 (out of 20) on departmental test.
	MATH 0.02	0	6*	Topics from elementary algebra.	0-24 on CMAT and over 13 on arithmetic portion.	Over 24 on CMAT and departmental final examination.
	MATH 0.03	0	6*	Topics from elementary algebra and geometry.	Over 24 on CMAT; high school record and field of study.	Faculty judgment; instructor or departmental final exam.
	MATH 0.04	0	4*	Topics from 11th-year mathematics.	Same as MATH 0.03.	Same as MATH 0.03.
	MATH 0.05	0	4*	Introduction to logarithms and trigonometry.	Same as MATH 0.03	Same as MATH 0.03.
	*Half-semester course.					
CITY	Liberal Arts Sequence					
	MATH 51	0	4	Preparation for CMAT.	For all courses: field of study, high school record and score on local test incorporating CMAT. (See page 12.)	Over 21 on CMAT.
	MATH 52	1	3	Topics from algebra and geometry.		Locally-prepared tests.
	MATH 53	1	3	Selected modern topics.		Locally-prepared tests.

	Science-Oriented Sequence					
CITY	MATH 54	0	4	Topics from elementary algebra.	For all courses: field of study, high school record, and score on local test incorporating CMAT. (See page 12.)	For all courses: locally-prepared tests.
	MATH 55	1	4	Topics from 11th-year mathematics.		
	MATH 56	3	4	Topics from precalculus.		
HUNTER	MATH 001	0-3	4	Preparation for CMAT; topics from statistics.	0-24 on CMAT.	Over 24 on CMAT; also departmental tests.
	PHYSC 001	0-3	4	Pre-science topics. (Administered by the Physics Department.)	Over 24 on CMAT; 0-29 on California Achievement Test, Level V, Parts 2-3.	Departmental final examination.
	ACSK 011*	0-3	4	Same as MATH 001.	Same as MATH 001.	Departmental tests and CMAT.
	ACSK 012*	0-3	4	Same as PHYSC 001.	Same as PHYSC 001.	Departmental tests.
	*For SEEK students; administered by Academic Skills/SEEK.					
JOHN JAY	MATH 095*	0	4	Arithmetic.	0-12 on departmental test; review of test.	For all courses: faculty judgment; departmental final examination.
	MATH 100	0	3	Arithmetic.	0-12 on departmental test; review of test.	
	MATH 103	0	3	Topics from elementary algebra.	13-23 on departmental test; review of test.	
	MATH 104	3	3	Topics from 11th-year mathematics.	Completion of MATH 103.	
	*For SEEK students; administered jointly by Mathematics and SEEK Departments.					
LEHMAN	MAT 004	0	3	Arithmetic.	0-24 on CMAT; 0-13 on arithmetic portion.	Over 24 on CMAT.
	MAT 005	1	4	Algebra for CMAT.	0-21 on CMAT; over 13 on arithmetic portion.	Over 24 on CMAT.
	MAT 008	0	1	Preparation for CMAT.	22-24 on CMAT; over 13 on arithmetic portion.	Over 24 on CMAT.
	MAT 016	1	4	Elementary algebra.	Over 24 on CMAT; no high school algebra.	Faculty judgment.
	MAT 017	2	4	Topics from analytic and synthetic geometry.	Over 24 on CMAT; no high school geometry.	Faculty judgment.

TABLE 1 (cont'd) BASIC MATHEMATICS PROGRAM CHART SENIOR COLLEGES

	COURSE NUMBER	CREDITS	HOURS	CONTENT	PLACEMENT PROCEDURES	EXIT CRITERIA
QUEENS	MATH 01*	0	4	Arithmetic; topics from elementary algebra.	0-24 on CMAT, local test, and interview.	Faculty judgment; departmental final examination.
	MATH 02	0	3	Arithmetic.	Identification by instructor.	Faculty judgment.
	MATH 04	2	4-6	Elementary algebra; topics from geometry.	0-24 on CMAT or score on local test.	Faculty judgment; departmental final examination.
	MATH 05	2	5-6	Topics from statistics and 11th-year mathematics.	Score on local test; field of study.	Faculty judgment; departmental final examination.
	MATH 06	2	5-6	Precalculus.	Score on local test; field of study	Faculty judgment; departmental final examination.
	*For SEEK students; administered by SEEK Department.					
STATEN IS.	MTH 00P	0	3	Preparation for CMAT.	0-17 on CMAT; liberal arts students scoring 18-24 can elect course.	Over 24 on CMAT or faculty judgment.
	MTH 001	1	4	Topics from elementary algebra.	18-24 on CMAT; field of study.	Faculty judgment; departmental tests.
	MTH 002	1	4*	Intermediate algebra.	Field of study; completion of previous remedial courses.	Faculty judgment; departmental tests.
	MTH 107	C	2	Medical dosages.	Nursing students scoring 18-24 on CMAT.	Departmental tests.
	*Half-semester course.					
YORK	MATH 010	1	3	Topics from arithmetic, elementary algebra, and geometry.	For all courses: combination of CMAT score, high school record, and field of study. (See pages 48 and 49.)	For all courses: faculty judgment; individual faculty tests.
	MATH 011	1	3	Topics from elementary algebra and geometry.		
	MATH 101	1	4	Topics from intermediate algebra and trigonometry.		
	MATH 180	2	4	Topics from 11th-year mathematics and statistics.		
	MATH 187	2	4	Same as MATH 180.		
	MATH 202	1	4	Accelerated MATH 010-011.		
	MATH 100*	1½	6	Same as MATH 010-011.		
	*For SEEK students; administered jointly by Mathematics and SEEK Departments.					

TABLE 2

BASIC MATHEMATICS PROGRAM CHART
(Unless noted, courses are in mathematics departments.)

COMMUNITY COLLEGES

	COURSE NUMBER	CREDITS	HOURS	CONTENT	PLACEMENT PROCEDURES	EXIT CRITERIA
MANHATTAN	MAT 010	0	6	Arithmetic; linear equations.	0-7 on arithmetic portion of CMAT.	Instructor or departmental final examination.
	MAT 011	0	3	Linear equations.	8-14 on arithmetic portion of CMAT; field of study.	Instructor or departmental final examination.
	MAT 012	0	6	Arithmetic; elementary algebra.	12-14 on arithmetic portion of CMAT; field of study.	Over 24 on CMAT.
	MAT 051	0	4	Elementary algebra.	Proficiency in arithmetic; 0-11 on algebra portion of CMAT; field of study.	Over 24 on CMAT.
BRONX	MTH 05	0	6	Topics from arithmetic, elementary algebra, and geometry.	0-24 on CMAT.	Over 24 on CMAT; faculty judgment; class tests.
	MTH 06	0	6	Topics from 11th-year mathematics.	Over 24 on CMAT; field of study; interview.	Faculty judgment; locally-prepared tests.
	MTH 07	0	4	Further topics from 11th-year mathematics.	Over 24 on CMAT; field of study; interview.	Faculty judgment; locally-prepared tests.
EVERS	MTH 002	0	4	Arithmetic; measurement; topics from elementary algebra.	0-24 on CMAT.	Over 24 on CMAT or over 69 on departmental final examination.
	MTH 131	2	4	Topics from algebra.	25-34 on CMAT.	Over 24 on CMAT and over 69 on departmental final examination.
HOSTOS	Liberal Arts Sequence					
	MATH 1600	1	6	Arithmetic.	0-13 on arithmetic portion of CMAT.	For all courses: faculty judgment; faculty or departmental tests.
	MATH 1612	2	6	Selected topics from algebra.	0-24 on CMAT; 14-20 on arithmetic portion.	
	Science-Oriented Sequence					
	MATH 1604	1	6	Arithmetic; measurement.	Same as MATH 1600.	
	MATH 1622	2	6	Elementary algebra.	Same as MATH 1612.	

TABLE 2 (cont'd.)

BASIC MATHEMATICS PROGRAM CHART
(Unless noted, courses are in mathematics departments.)

COMMUNITY COLLEGES

	COURSE NUMBER	CREDITS	HOURS	CONTENT	PLACEMENT PROCEDURES	EXIT CRITERIA
KINGSB.	MAT R1	0	4	Arithmetic.	0-14 on CMAT.	Faculty judgment; departmental tests.
	MAT R2	0	5	Algebra for CMAT.	15-19 on CMAT.	Over 24 on CMAT.
	MAT 01	0	4	Elementary algebra.	0-19 on CMAT; 11-19 on arithmetic portion; field of study.	Faculty judgment; faculty tests.
	MAT 03	0	4	Topics from 11th-year mathematics.	Over 19 on CMAT; field of study; high school courses.	Faculty judgment; faculty tests.
LaGUAR.	MAT 098	1	5	Arithmetic.	0-13 on CMAT.	For both courses: Faculty judgment; faculty or departmental tests.
	MAT 099	1	4	Measurement; topics from elementary algebra.	14-25 on CMAT or low score on "waiver" test.	
NYC TECH	DM 050*	0	4	Arithmetic; measurement; topics from elementary algebra.	0-13 on arithmetic portion of CMAT; field of study.	For both courses: Faculty judgment; departmental final examination.
	DM 060*	0	5	Elementary algebra.	Score on CMAT; field of study; local test.	
	*Administered by Department of Developmental Skills.					
QUEENSB.	MA 009	0	3	Mathematics for nursing students.	Nursing students; score on local test incorporating CMAT. (See page 86.)	Faculty judgment; locally-prepared tests.
	MA 010*	0	5	Arithmetic; topics from elementary algebra and geometry.	Score on local test places student into specific module.	Faculty-prepared exit examinations for each module.
	MA 020*	0	5	Topics from 11th-year mathematics.	Field of study. Score on local test places student into specific module.	Faculty-prepared exit examinations for each module.
	*Modularized; four modules.					

APPENDIX A

THE CUNY MATHEMATICS SKILLS ASSESSMENT TEST

The purpose of this booklet is to acquaint students, parents, counselors, and teachers with the City University Mathematics Skills Assessment Test. Section I contains a description of the test and sample questions. Section II offers advice and additional sample questions for students who intend to study subjects in college that require more advanced mathematics.

The Mathematics Skills Assessment Test is one of three Skills Assessment Tests given to students entering the City University of New York (CUNY). The other two are in reading and writing. These three tests are not used for admission. Students whose scores indicate that they need further work in basic skills will be assigned to courses or given other assistance to prepare them for college-level work. Anyone who initially fails any of the tests will be given a chance to take retests at later dates. Students must pass all three tests by the beginning of their junior year or they will not be permitted to enroll in further college courses until they have met these CUNY standards. Further information concerning the Freshman Skills Assessment Program is available in the Student Information Bulletin distributed by the University's Office of Academic Affairs.

SECTION I

DESCRIPTION OF THE CUNY MATHEMATICS SKILLS ASSESSMENT TEST

The test consists of 40 multiple-choice questions: 20 in arithmetic and 20 in algebra. The arithmetic questions cover such topics as: operations with whole numbers, fractions, decimals, and signed numbers; ratio and proportion; percent; measurement; and word problems. The algebra questions cover topics from ninth-year algebra, including exponents, square roots, factoring, solving linear equations with one variable, solving systems of linear equations, and graphing. Calculators are not permitted on the test. The maximum score on the exam is 40, and the minimum passing score is 25. Time allowed for the test is 50 minutes. Sample questions 1-40 follow.

Students should attempt to master these basic skills before they enter college by taking the appropriate courses while they are still in high school. Students who covered this material in earlier classes may benefit from review in their senior year.

Students who intend to major in mathematics-related fields such as business, computer science, economics, engineering, science (including pre-med), and technology need to understand mathematical concepts beyond the basic arithmetic and algebra covered by the CUNY Mathematics Skills Assessment Test. If you intend to pursue one of these fields, you should read Section II of this booklet for additional information and recommendations.

Questions 1-40 are sample questions for the CUNY Mathematics Skills Assessment Test. The answers are listed after question 40.

(1) Forty million, one hundred twenty-eight is written:

(a) 40,128 (b) 4,128 (c) 40,128,000

(d) 40,000,128 (e) 40,000,000,128

(2) The average of 6, 3, 8, and 23 is

(a) 10 (b) 40 (c) 4

(d) 22 (e) 20

(3) 3 hours 15 minutes
-1 hour 35 minutes

(a) 1 hour 50 minutes (b) 2 hours 50 minutes

(c) 1 hour 20 minutes (d) 2 hours 20 minutes

(e) 1 hour 40 minutes

(4) $1702 \div 37 =$

(a) 46 (b) 406 (c) 460

(d) 4060 (e) 4006

(5) $607 - 39 =$

(a) 646 (b) 632 (c) 568

(d) 602 (e) 575

(6) Which of the following fractions is smallest?

(a) $\frac{1}{5}$ (b) $\frac{2}{9}$ (c) $\frac{1}{10}$

(d) $\frac{3}{8}$ (e) $\frac{2}{1}$

(7) A group sells 327 tickets to a concert at $4.00 each. If the expenses for the concert are $600, how much money does the club make?

(a) $273 (b) $927 (c) $1308

(d) $808 (e) $708

(8) $\frac{1}{5} + \frac{4}{7} =$

(a) $\frac{27}{35}$ (b) $\frac{5}{12}$ (c) $\frac{4}{35}$

(d) $\frac{4}{12}$ (e) $\frac{5}{28}$

(9) $5\frac{3}{7} - 3\frac{5}{7} =$

(a) $2\frac{2}{15}$ (b) $3\frac{2}{7}$ (c) $1\frac{7}{15}$

(d) $2\frac{2}{7}$ (e) $1\frac{5}{7}$

(10) $6\frac{2}{3} \div 10 =$

(a) $\frac{3}{7}$ (b) 4 (c) $\frac{2}{3}$

(d) $\frac{200}{3}$ (e) $\frac{3}{2}$

(11) Which of the following numbers is largest?

(a) .0098 (b) .21 (c) .09

(d) .1000 (e) .200

(12) $.368 + 4 + 31.82 =$

(a) 9.54 (b) 36.188 (c) 37.188

(d) 7.540 (e) 35.1188

(13) $61.4 - 5.38 =$

(a) 67.78 (b) 55.02 (c) 1.76

(d) 7.6 (e) 56.02

(14) Change $\frac{7}{8}$ to a decimal number rounded to the nearest hundredth.

(a) .8 (b) .87 (c) .88

(d) .9 (e) .876

(15) It takes Mary Commuter $.23 a mile to drive her car. If she drives 97 miles each week, how much does it cost her each week to drive her car?

(a) $6 (b) $22.31 (c) $223.1

(d) $2.23 (e) $23

(16) 30% of 45 is:

(a) 15 (b) 135 (c) 13.5

(d) 12.5 (e) 150

(17) If 40% of a number is 876, what is the number?

(a) 350.40 (b) 21.9 (c) 219

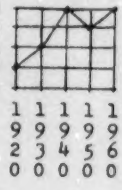
(d) 2190 (e) 3504

(18) If a suit sells for $60.00 and the tax is 8%, how much must you pay for the suit?

(a) $68.00 (b) $48.00 (c) $648

(d) $60.48 (e) $64.80

(19) The graph at the right shows the population of a town for different years. The difference in population between 1930 and 1950 is:



(a) 1000 (b) 2000 (c) 3000

(d) 4000 (e) 5000

(20) The area of a circular disk of radius 10" is: (Given $\pi = 3.14$)

(a) 31.4 square inches (b) 314 square inches

(c) 628 square inches (d) 100 square inches

(e) 62.8 square inches

(21) The sum of $3x-4y$ and $-2x+y$ is:

(a) $x+3y$ (b) x^2-3y^2 (c) $x-3y$

(d) $-x+3y$ (e) $-6x^2-4y^2$

(22) The product of $5y^3z^2$ and $3z$ is:

(a) $8y^3z^3$ (b) $15y^4z^2$ (c) $8y^4z^2$

(d) $15y^4+3z^2y$ (e) $15y^3z^3$

(23) Simplify: $\frac{4x-12}{4}$

(a) $x-8$ (b) $x-12$ (c) $x-3$

(c) $4x-3$ (e) $4x-8$

(24) Simplify: $3a^2b^2-2ab^2(a-b)$

(a) $a^2b^2+2ab^3$ (b) $a^2b^2-2ab^3$ (c) $5a^2b^2+2ab^3$

(d) a^2-b^2 (e) $3a^2b^2-3ab^2-2ab$

(25) Add: $4x^2-3x+2$ and $4x-3$

(a) $8x^3-6x+2$ (b) $4x^2+x-1$ (c) $4x^2-7x-5$

(d) $4x^2-7x-5$ (e) $5x^2-1$

(26) $(2xy^3)^4 =$

(a) $8x^4y^{12}$ (b) $8xy^3$ (c) $2xy^7$

(d) $16x^4y^7$ (e) $16x^4y^{12}$

(27) Factor: $6x^2-24x$

(a) $-18x$ (b) $6x(x-4)$ (c) $6x^2(1-4x)$

(d) $-18x^2$ (e) $6(x-4)$

(28) $(-4)^2+3(-2) =$

(a) 10 (b) -14 (c) -22

(d) 22 (e) 2

(29) If $4x+5 = 65$, then $x =$

(a) 56 (b) $\frac{13}{4}$ (c) 9

(d) -15 (e) 15

(30) If $\frac{x}{6} = \frac{1}{12} + \frac{x}{8}$, then $x =$

(a) 24 (b) 20 (c) 12

(d) 2 (e) 1

(31) Which of the following points lies on the graph of $y = 3x-4$?

(a) (3,-4) (b) (3,4) (c) (3.5,

(d) (5,3) (e) (4,3)

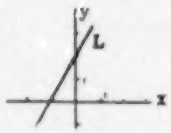
(32) If white paint costs 7 dollars for a can and green paint costs 9 dollars for a can, then how much will x cans of white paint and y cans of green paint cost together?

(a) 16xy dollars (b) 16(x+y) dollars

(c) 7x+y dollars (d) 7x+9y dollars

(e) 8(x+y) dollars

(33) An equation for the line L on the right is:



(a) $x=-1$ (b) $y=2$ (c) $y=2x-1$

(d) $y=2x+2$ (e) $y=-x+2$

(34) Find the value of P if x=3 in the formula $P = 10(2)^x$.

(a) 50 (b) 60 (c) 80

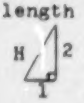
(d) 90 (e) 8000

(35) If $3x-5=y$, then $x=$

(a) $\frac{y-5}{3}$ (b) $y+5$ (c) $\frac{y}{3}+5$

(d) $y+2$ (e) $\frac{y+5}{3}$

(36) In the right triangle shown below, the length of the side labeled H is:



(a) $\sqrt{5}$ (b) 5 (c) $\sqrt{3}$

(d) 3 (e) 2

(37) If $2x+y = 1$ and $x-y = -7$, then

(a) $x=0$, $y=1$ (b) $x=1$, $y=-1$ (c) $x=2$, $y=-3$

(d) $x=-2, y=5$ (e) $x=-2, y=-5$

(38) In a certain company, 3 out of 5 employees are men. How many women work for the company if there are 600 men working there?

(a) 60 (b) 240 (c) 360

(d) 400 (e) 1000

(39) A farmer encloses a square field with 400 feet of fencing. The area of the field is:

(a) 400 square feet (b) 1600 square feet

(c) 20 square feet (d) 10,000 square feet

(e) 160,000 square feet

(40) A student has grades of 73, 95 and 82 on the first three tests in a course. What grade must the student get on the fourth test to have an average of 85 on all four tests?

(a) 95 (b) 90 (c) 88

(d) 87 (e) 83

Answers: 1 - 40

1. d	11. b	21. c	31. c
2. a	12. b	22. e	32. d
3. e	13. e	23. c	33. d
4. a	14. c	24. a	34. c
5. c	15. b	25. b	35. e
6. c	16. c	26. e	36. a
7. e	17. d	27. b	37. d
8. a	18. e	28. a	38. d
9. e	19. a	29. e	39. d
10. c	20. b	30 d	40. b

APPENDIX A

SECTION II

ADDITIONAL INFORMATION FOR STUDENTS WHO INTEND TO MAJOR IN MATHEMATICS-RELATED FIELDS

Most of the CUNY colleges use high school records and/or a special placement test to place students in mathematics courses which cover material beyond the level of the CUNY Mathematics Skills Assessment Test. Typically, such material is taught in a sequence such as elementary algebra, intermediate algebra and trigonometry, precalculus, and calculus. It is to the students' advantage to learn as much of this material as possible before entering college. Although students who know relatively little of this material can still succeed in algebra, trigonometry, and calculus courses in college, they may require some extra time to complete their studies. High school students interested in mathematics-related fields are, therefore, advised to take three or four years of academic high school mathematics, if possible.

Questions 41-65, which follow, illustrate topics which might appear on a special placement test.

Questions 41-65 illustrate the types of topics that students might see on a placement test in mathematics. They are <u>not</u> sample questions for the CUNY Mathematics Skills Assessment Test.

(41) $(3x+5)(x-1)=$

(a) $3x^2-5$ (b) $4x+4$ (c) $3x-5$ (d) $3x^2+2x-5$

(42) Divide: $\frac{8a^6b^2}{3ab} \div \frac{4a^2}{3b} =$

(a) $2a^3b^2$ (b) $\frac{32a^7}{9}$ (c) $2a^2b^2$ (d) $\frac{1}{2a^3b^2}$

(43) Combine: $\frac{5a}{b} - \frac{1}{a}$

(a) $\frac{5a-1}{b-a}$ (b) $\frac{5a^2-b}{ab}$ (c) $-\frac{5}{b}$ (d) $\frac{4}{b-1}$

(44) Simplify: $\frac{x^3+x^2-6x}{x^2-4}$

(a) $\frac{x^3-6x}{-4}$ (b) $\frac{x^2+3x}{x+2}$ (c) $\frac{x^3+1-6x}{-3}$ (d) $\frac{x^2-3x}{x-2}$

(45) If $2x^2+5x = 3x^2-2x$, then $x=$

(a) -7 or 0 (b) 0 or 7 (c) 3 or 2 (d) 3 or -2

(46) Write in symbols: x is 5 less than the sum of y and z.

(a) $x+5=y+z$ (b) $x-5=y+z$ (c) $5-x=y+z$ (d) $x+y+z=5$

(47) $\frac{|-2|-|3|}{|2-3|} =$

(a) 1 (b) -1 (c) 5 (d) -1/5

(48) If a square has a diagonal of length 10 feet, then its area is:

(a) 100 square feet (b) 50 square feet

(c) 25 square feet (d) $\sqrt{50}$ square feet

(49) If $x^2-3x+1=0$, then $x=$

(a) 2 or -1 (b) $\frac{3\pm\sqrt{5}}{2}$ (c) $\frac{-3\pm\sqrt{13}}{2}$ (d) ± 21

(50) Solve: $1-4x < 9$

(a) $x<2$ (b) $x=-2$ (c) $x>2$ (d) $x>-2$

(51) Find the height h in the triangle on the right.

(a) h=28 (b) h=4

(c) $h=\frac{4}{7}$ (d) $h=\frac{28}{5}$

(52) Rationalize the denominator: $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

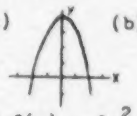
(a) $2-\sqrt{3}$ (b) $\frac{2-\sqrt{3}}{2}$ (c) -1 (d) 2

(53) If $u = 5^x+5^{-x}$, then $u^2=$

(a) $25^{2x} + 25^{-2x}$ (b) $5^{2x} + 2 + 5^{-2x}$

(c) $5^{2x} + 5^{-2x}$ (d) $5^{(x^2)} + 5^{(-x^2)} + 2$

(54) The graph of $y = 4-x^2$ is:

(a) 

(b)

(c)

(d)

(55) If $f(x) = 2x^2-5x+1$, then $f(3)-f(1)=$

(a) f(2) (b) 2 (c) 5 (d) 6

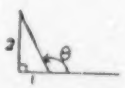
(56) In the triangle on the right, angle x=

(a) 10° (b) 30° (c) 40° (d) 20°

(57) If tan A = 4, then the area of triangle ABC is:

(a) $\frac{5}{2\sqrt{2}}$ (b) $\frac{5}{8}$ (c) $\frac{25}{8}$ (d) $\frac{5}{4}$

(58) $\cos\theta =$



(a) $\frac{-1}{\sqrt{5}}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) 2

(59) Find all values of x (in radians) between 0 radians and 2π radians, such that $\sin x = -\frac{1}{2}$.

(a) $\pm\frac{\pi}{6}$ (b) $\frac{\pi}{6}$ (c) $\frac{2\pi}{6}, \frac{11\pi}{6}$ (d) $\frac{4\pi}{3}, \frac{5\pi}{3}$

(60) If x is between 0° and 90° and $\cos x = \sqrt{7}/4$, then $\sin x =$

(a) $\frac{5}{4}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{4}{3}$

(61) If $\log_3 x = 4$, then $x=$

(a) 64 (b) 12 (c) 4/3 (d) 81

(62) If $\log_{10} A = 5$ and $\log_{10} B = 3$, then $\log_{10}\left(\frac{A}{B}\right)^2 =$

(a) $\frac{25}{3}$ (b) 22 (c) 7 (d) $\frac{10}{3}$

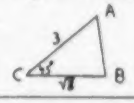
(63) $\frac{16^{\frac{1}{4}} + 9^0}{4^{-\frac{1}{2}}} =$

(a) $\frac{-3}{2}$ (b) $\frac{3}{2}$ (c) 4 (d) 6

(64) The domain of the function f where $f(x)=\sqrt{x^2-4}$ is:

(a) The set of all real numbers.
(b) {4}
(c) $\{x \mid x \geq 2\}$
(d) $\{x \mid x \leq -2 \text{ or } x \geq 2\}$

(65) In triangle ABC, the length of side AB =



(a) $\sqrt{8}$ (b) $\sqrt{29}$

(c) 1 (d) $\sqrt{5}$

Answers: 41. d 42. a 43. b 44. b 45. b 46. a 47. b 48. b 49. b 50. d
51. d 52. a 53. b 54. a 55. d 56. b 57. c 58. a 59. c 60. b
61. d 62. c 63. d 64. d 65.

APPENDIX B

Interview Questionnaire

Course Structure, Content, and Administration

1. Number, title, credits and hours for each course.
2. Content of each course.
3. Organization into sequences; intended population for each sequence.
4. Department administering each course.

Placement Procedures; Student Population

1. Role of CUNY Mathematics Assessment Test (CMAT).
2. Role of other tests; names, origin, and cut scores.
3. Role of other criteria:

   a. High school record.
   b. Field of study.
   c. Self-identification.
   d. Interview.

4. Proportion of entering students placed into remedial program.

Methods of Instruction

1. Classroom or individualized.
2. Instructor-paced or student-paced.
3. Use of innovative resources (computers, videotape, etc.)

Support Services

1. Availability of mathematics laboratory: staffing, resources.
2. Availability of tutoring.
3. Other support services.

Exit Criteria

1. Local tests: prepared by instructor or department?
2. CMAT.
3. Class tests.
4. Faculty judgment.

Staffing

1. Use of full-time departmental faculty.
2. Use of full-time out-of-department faculty.
3. Use of adjuncts.

Response to CMAT

APPENDIX C

BASIC MATHEMATICS RESOURCE PERSONS

COLLEGE	DEPARTMENT	RESOURCE PERSONS
Senior Colleges		
BARUCH	Mathematics	Warren Gordon
BROOKLYN	Mathematics	Nosup Kwak
CITY	Mathematics	John Miller Daniel Mosenkis
HUNTER	Mathematics	Sandra Clarkson
	Physics	Marilyn Rothchild
	Academic Skills	Namby Krishnamachari
JOHN JAY	Mathematics	Sam Graff
LEHMAN	Mathematics	Israel Rose
QUEENS	Mathematics	Arthur Goodman
STATEN ISLAND	Mathematics	Leon Ablon
YORK	Mathematics	Joseph Malkevich
Community Colleges		
BMCC	Mathematics	Geoffrey Akst
BRONX	Mathematics	Erwin Just
MEDGAR EVERS	Mathematics	Umesh Nagarkatte
HOSTOS	Mathematics	Tom Joyce
KINGSBOROUGH	Mathematics	Sam Gale
LAGUARDIA	Mathematics	Barbara Muir Howard Kellogg
NYC TECHNICAL	Academic Testing	Matthew Graber
QUEENSBOROUGH	Mathematics	Juliana Corn

ABOUT THE AUTHOR

Miriam Hecht of Hunter College has been active as an author, administrator, and consultant in remedial mathematics since 1970. She coordinated Hunter's Remedial Arithmetic Program from its inception in 1972 until 1978, when she was chosen to chair the CUNY Task Force on Mathematics Skills Assessment. She is a member of the National Panel on Remediation of the Mathematical Association of America (MAA) and is listed in the MAA Directory of Consultants and Lecturers as a specialist in mathematics remediation.